

EMX512SC EMX312SC EMX212S

POWERED MIXER

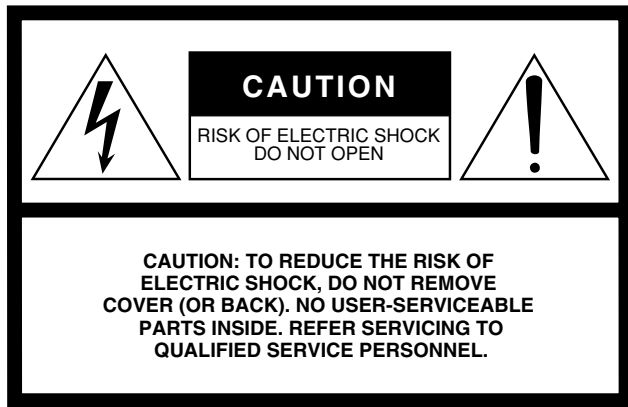
Owner's Manual

Quick Guide

Pages 6 to 12

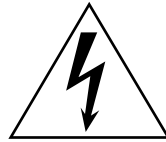
Making the Most of Your Mixer

Pages 13 to 19



The above warning is located on the rear of the unit.

Explanation of Graphical Symbols



The lightning flash with arrowhead symbol within an equilateral triangle is intended to alert the user to the presence of uninsulated “dangerous voltage” within the product’s enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.



The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the product.

IMPORTANT SAFETY INSTRUCTIONS

- 1 Read these instructions.
- 2 Keep these instructions.
- 3 Heed all warnings.
- 4 Follow all instructions.
- 5 Do not use this apparatus near water.
- 6 Clean only with dry cloth.
- 7 Do not block any ventilation openings. Install in accordance with the manufacturer’s instructions.
- 8 Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
- 9 Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The wide blade or the third prong are provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
- 10 Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.
- 11 Only use attachments/accessories specified by the manufacturer.
- 12 Use only with the cart, stand, tripod, bracket, or table specified by the manufacturer, or sold with the apparatus. When a cart is used, use caution when moving the cart/apparatus combination to avoid injury from tip-over.
- 13 Unplug this apparatus during lightning storms or when unused for long periods of time.
- 14 Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.



WARNING

TO REDUCE THE RISK OF FIRE OR ELECTRIC SHOCK, DO NOT EXPOSE THIS APPARATUS TO RAIN OR MOISTURE.

(98-6500)

IMPORTANT

Please record the serial number of this unit in the space below.

Model:

Serial No.:

The serial number is located on the bottom or rear of the unit.
Retain this Owner’s Manual in a safe place for future reference.

PRECAUTIONS

PLEASE READ CAREFULLY BEFORE PROCEEDING

* Please keep this manual in a safe place for future reference.



WARNING

Always follow the basic precautions listed below to avoid the possibility of serious injury or even death from electrical shock, short-circuiting, damages, fire or other hazards. These precautions include, but are not limited to, the following:

Power supply/Power cord

- Only use the voltage specified as correct for the device. The required voltage is printed on the name plate of the device.
- Use only the included power cord.
- Do not place the power cord near heat sources such as heaters or radiators, and do not excessively bend or otherwise damage the cord, place heavy objects on it, or place it in a position where anyone could walk on, trip over, or roll anything over it.
- Be sure to connect to an appropriate outlet with a protective grounding connection. Improper grounding can result in electrical shock.

Do not open

- Do not open the device or attempt to disassemble the internal parts or modify them in any way. The device contains no user-serviceable parts. If it should appear to be malfunctioning, discontinue use immediately and have it inspected by qualified Yamaha service personnel.

Water warning

- Do not expose the device to rain, use it near water or in damp or wet conditions, or place containers on it containing liquids which might spill into any openings.
- Never insert or remove an electric plug with wet hands.

If you notice any abnormality

- If the power cord or plug becomes frayed or damaged, or if there is a sudden loss of sound during use of the device, or if any unusual smells or smoke should appear to be caused by it, immediately turn off the power switch, disconnect the electric plug from the outlet, and have the device inspected by qualified Yamaha service personnel.
- If this device should be dropped or damaged, immediately turn off the power switch, disconnect the electric plug from the outlet, and have the device inspected by qualified Yamaha service personnel.



CAUTION

Always follow the basic precautions listed below to avoid the possibility of physical injury to you or others, or damage to the device or other property. These precautions include, but are not limited to, the following:

Power supply/Power cord

- Remove the electric plug from the outlet when the device is not to be used for extended periods of time, or during electrical storms.
- When removing the electric plug from the device or an outlet, always hold the plug itself and not the cord. Pulling by the cord can damage it.

Location

- Before moving the device, remove all connected cables.
- When setting up the product, make sure that the AC outlet you are using is easily accessible. If some trouble or malfunction occurs, immediately turn off the power switch and disconnect the plug from the outlet. Even when the power switch is turned off, electricity is still flowing to the product at the minimum level. When you are not using the product for a long time, make sure to unplug the power cord from the wall AC outlet.
- If this device is to be mounted in an EIA-standard rack, leave the back of the rack open and make sure that it is at least 10 cm away from walls or surfaces. Also, if this device is to be mounted with devices that tend to generate heat, such as power amplifiers, be sure to keep an adequate gap between this device and the heat-generating devices or install ventilation panels to prevent high temperatures from developing inside this device. Inadequate ventilation can result in overheating, possibly causing damage to the device(s), or even fire.
- Do not use the device in a confined, poorly-ventilated location. If this device is to be used in a small space other than an EIA-standard rack, make sure that there is adequate space between the device and surrounding walls or other devices: at least 10 cm at the sides, 25 cm behind and 15 cm above. Inadequate ventilation can result in overheating, possibly causing damage to the device(s), or even fire.
- Avoid setting all equalizer controls and faders to their maximum. Depending on the condition of the connected devices, doing so may cause feedback and may damage the speakers.
- Do not expose the device to excessive dust or vibrations, or extreme cold or heat (such as in direct sunlight, near a heater, or in a car during the day) to prevent the possibility of panel disfiguration or damage to the internal components.

- Do not place the device in an unstable position where it might accidentally fall over.
- Do not block the vents. This device has ventilation holes at the rear and side to prevent the internal temperature from becoming too high. In particular, do not place the device on its side or upside down. Inadequate ventilation can result in overheating, possibly causing damage to the device(s), or even fire.
- Do not use the device in the vicinity of a TV, radio, stereo equipment, mobile phone, or other electric devices. Doing so may result in noise, both in the device itself and in the TV or radio next to it.

Connections

- Before connecting the device to other devices, turn off the power for all devices. Before turning the power on or off for all devices, set all volume levels to minimum.
- Use only speaker cables for connecting speakers to the speaker jacks. Use of other types of cables may result in fire.

Handling caution

- When turning on the AC power in your audio system, always turn on the device or external power amplifiers LAST, to avoid speaker damage. When turning the power off, the device or external power amplifiers should be turned off FIRST for the same reason.
- Do not insert your fingers or hands in any gaps or openings on the device (vents, etc.).
- Avoid inserting or dropping foreign objects (paper, plastic, metal, etc.) into any gaps or openings on the device (vents, etc.) If this happens, turn off the power immediately and unplug the power cord from the AC outlet. Then have the device inspected by qualified Yamaha service personnel.
- Do not use the device for a long period of time at a high or uncomfortable volume level, since this can cause permanent hearing loss. If you experience any hearing loss or ringing in the ears, consult a physician.
- Do not rest your weight on the device or place heavy objects on it, and avoid use excessive force on the buttons, switches or connectors.

XLR-type connectors are wired as follows (IEC60268 standard): pin 1: ground, pin 2: hot (+), and pin 3: cold (-).
Use only Neutrik plugs (NL4) for connecting Speakon connectors.

Yamaha cannot be held responsible for damage caused by improper use or modifications to the device.

Always turn the power off when the device is not in use.

The performance of components with moving contacts, such as switches, volume controls, and connectors, deteriorates over time. Consult qualified Yamaha service personnel about replacing defective components.


IMPORTANT NOTICE FOR THE UNITED KINGDOM Connecting the Plug and Cord

WARNING: THIS APPARATUS MUST BE EARTHED

IMPORTANT. The wires in this mains lead are coloured in accordance with the following code:

GREEN-AND-YELLOW	: EARTH
BLUE	: NEUTRAL
BROWN	: LIVE

As the colours of the wires in the mains lead of this apparatus may not correspond with the coloured markings identifying the terminals in your plug proceed as follows:

The wire which is coloured GREEN-and-YELLOW must be connected to the terminal in the plug which is marked by the letter E or by the safety earth symbol  or coloured GREEN or GREEN-and-YELLOW.

The wire which is coloured BLUE must be connected to the terminal which is marked with the letter N or coloured BLACK.

The wire which is coloured BROWN must be connected to the terminal which is marked with the letter L or coloured RED.

• This applies only to products distributed by Yamaha-Kemble Music (U.K.) Ltd.

(3 wires)

FCC INFORMATION (U.S.A.)

1. IMPORTANT NOTICE: DO NOT MODIFY THIS UNIT!

This product, when installed as indicated in the instructions contained in this manual, meets FCC requirements. Modifications not expressly approved by Yamaha may void your authority, granted by the FCC, to use the product.

2. IMPORTANT: When connecting this product to accessories and/or another product use only high quality shielded cables. Cable/s supplied with this product **MUST** be used. Follow all installation instructions. Failure to follow instructions could void your FCC authorization to use this product in the USA.

3. NOTE: This product has been tested and found to comply with the requirements listed in FCC Regulations, Part 15 for Class "B" digital devices. Compliance with these requirements provides a reasonable level of assurance that your use of this product in a residential environment will not result in harmful interference with other electronic devices. This equipment generates/uses radio frequencies and, if not installed and used according to the instructions found in the users manual, may cause interference harmful to the operation of other electronic devices. Compliance with FCC

regulations does not guarantee that interference will not occur in all installations. If this product is found to be the source of interference, which can be determined by turning the unit "OFF" and "ON", please try to eliminate the problem by using one of the following measures:

Relocate either this product or the device that is being affected by the interference.

Utilize power outlets that are on different branch (circuit breaker or fuse) circuits or install AC line filter/s.

In the case of radio or TV interference, relocate/reorient the antenna. If the antenna lead-in is 300 ohm ribbon lead, change the lead-in to co-axial type cable.

If these corrective measures do not produce satisfactory results, please contact the local retailer authorized to distribute this type of product. If you can not locate the appropriate retailer, please contact Yamaha Corporation of America, Electronic Service Division, 6600 Orangethorpe Ave, Buena Park, CA90620

The above statements apply **ONLY** to those products distributed by Yamaha Corporation of America or its subsidiaries.

* This applies only to products distributed by YAMAHA CORPORATION OF AMERICA.

(class B)

About this Manual

This manual is divided into two main sections, as follows.

■ Mixer Basics (starts on page 6)

Presents a general explanation of mixers and mixer concepts. Includes a Quick Guide that will help beginners get up to speed very quickly.

■ EMX Setup and Operation (starts on page 20)

Provides detailed information about the EMX. Introduces the EMX features, identifies and explains the controls, indicators, and connectors; and explains how to set up the equipment.

* This manual applies to models EMX512SC, EMX312SC, and EMX212SC. Within this manual, the term "EMX" is used to refer to all three of these models.

* Illustrations herein are for explanatory purposes only, and may not match actual appearance during operation.

* Company names and product names herein are trademarks or registered trademarks of their respective companies.

Copying of commercially available music or other audio data for purposes other than personal use is strictly prohibited by copyright law. Please respect all copyrights, and consult with a copyright specialist if you are in doubt about permissible use.

Thank you for your purchase of this Yamaha EMX512SC, EMX312SC, or EMX212S power mixer. Please read through this manual carefully before beginning use, so that you will be able to take full advantage of your mixer's superlative features and enjoy trouble-free operation for years to come. After reading the manual, please store it in a safe place.

Contents

■ Basic

Quick Guide	6
Before Turning On the Mixer.....	6
Getting Sound to the Speakers.....	7
Adding Some Reverb.....	11
Using the Compressors to Enhance Vocals	12
Making the Most of Your Mixer	13
A Place for Everything and Everything in its Place	13
A Plethora of Connectors—What Goes Where? ...	13
Balanced, Unbalanced—What's the Difference? ..	14
Signal Levels and the Decibel.....	15
Making Better Mixes.....	15
Approaching the Mix—Where Do You Start?	15
To EQ or Not to EQ.....	16
Ambience	17
The Modulation Effects: Phasing, Chorus, and Flanging	18
Compression.....	18

■ Reference

Controls and Connectors	20
Controls on Each Channel	20
Digital Effects Section	22
MAIN Section	23
MONITOR Section	24
POWER Section	25
Rear Panel	26
Connecting Speakers	27
Horizontal Orientation, Tilting and Rack Mounting	28
Horizontal Orientation	28
Tilting	29
Rack Mounting	29
Setting Up	30
Troubleshooting	31
Specifications	32

Features

Input Channels..... page 20

The EMX offers four monoaural mic/line input channels (1 to 4) and four stereo input channel pairs (5/6 to 11/12), allowing you to freely mix inputs from microphones, line-level devices, and stereo devices. For example, you can mix four microphones with four stereo devices, or seven microphones with one stereo synthesizer.

Phantom Power (+15V)..... page 25

A single switch turns phantom power on to all mic inputs. Use this feature to provide power to condenser microphones.

High-Quality Digital Effects page 22

The mixer's internal effector is in the same league as our SPX effector series, allowing you to create a rich range of variations with no external help. But of course you are also free to use the EFFECT OUT jack to connect to an external effector of your choice.

MAIN and MONITOR Outputs page 23

The mixer offers excellent independent control of main and monitor output. The top panel offers separate main and monitor outputs, while the POWER AMP switch can be used to set the SPEAKERS jacks so that they output either the main signal to both speakers or else the main signal to one speaker and the monitor signal to the other. Separate MASTER control knobs and 7-segment graphic equalizers are also provided.

Compressors (EMX512SC and EMX312SC only) page 21

Compressors on channels 1 to 4 can be used to squeeze the dynamic range of inputs such as microphones and acoustic guitars, attenuating the higher levels and bringing out the lower ones. This feature helps reduce distortion and allows overall volume to be set higher, resulting in a stronger and more impressive sound.

Tilt Setup or Rack Mount page 29

The EMX can be positioned at an angle or mounted in a rack, allowing for easy accessibility in a wide variety of set-ups.

Internal Power Amp page 25

The internal amp makes it possible to connect the SPEAKERS jacks directly to non-powered speakers, with no need for an external amplifier in between. The rear panel offers two types of speaker connectors: phone jacks and Neutrik Speakon jacks.

Quick Guide

Before Turning On the Mixer

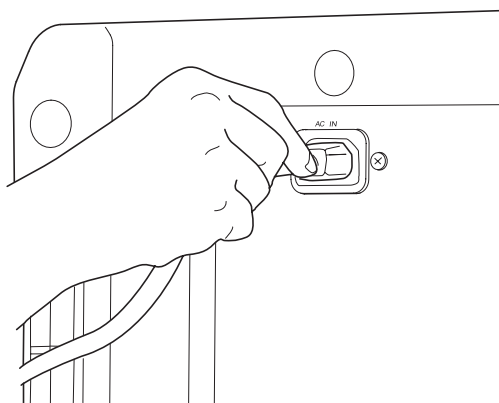
■ Connecting to Power

1

Be sure that the **POWER** switch is in the **OFF** position.

2

Connect the included power cord to the **AC IN** connector on the rear panel.

**3**

Plug the power cord into a standard power outlet.

■ Turning the Unit On and Off

NOTE

- To prevent an unpleasant burst of noise from the speakers, you should power up the sound sources first, and then the other devices in order of their distance from the source (starting with the closest).

For example: Sound source (external device) → EMX unit → Amps (Powered speakers)

When turning power off, proceed in the opposite order.

- Before turning power on, make sure that the **LEVEL** and **MASTER** knobs are set to the "0" position.

1

Push the **POWER switch in to turn the power ON.**

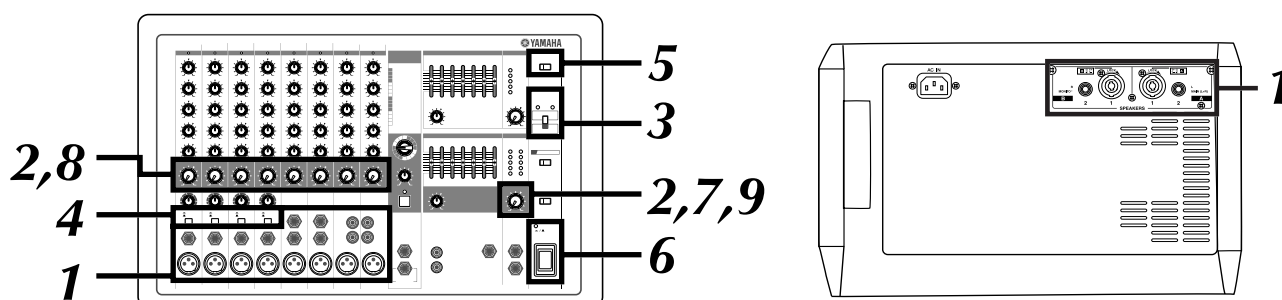
The power lamp lights up to indicate that power is on. To turn the power off, push the switch again, so that it pops out.



Rapidly turning the unit ON and OFF in succession can cause it to malfunction. After turning the unit OFF, wait for about 10 seconds before turning it ON again.

Getting Sound to the Speakers

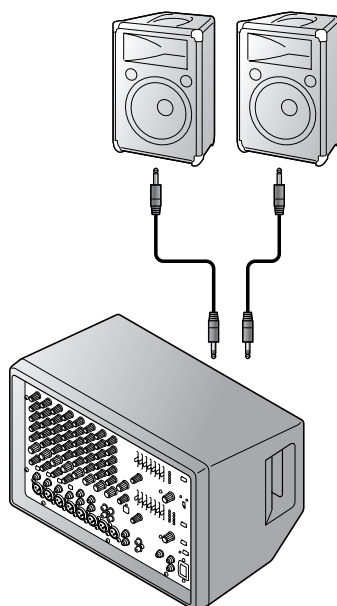
We begin by connecting up two speakers and generating some stereo output. Note that operations and procedures will vary somewhat according to the input devices you are using.



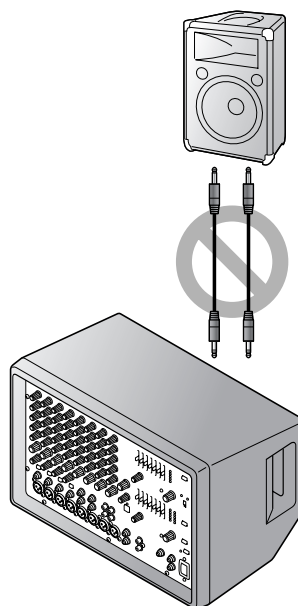
1 Connect up the speakers and your input devices (microphones, instruments, etc.)

Use non-powered speakers and dedicated speaker cable. Connect one speaker to SPEAKERS jack A (A1 or A2), and the other to jack B (B1 or B2). Then connect your input devices (microphones, guitar, etc.) to the appropriate input jacks on the top panel. For details, see page 30.

RIGHT



WRONG!!



Before connecting input devices to the EMX, be sure that all of these devices (including microphones) are powered off. And before turning the power to any device on or off, be sure to turn the volume of that device all the way down. Neglect of these precautions may result in large noise bursts that may damage your equipment, your ears, or both.

NOTE

We recommend that you do not connect electric instruments (such as electric guitars and basses) directly to the EMX. Instead, these instruments should be connected through an intermediary device such as a direct box, a preamp (guitar amp), or an amp simulator.

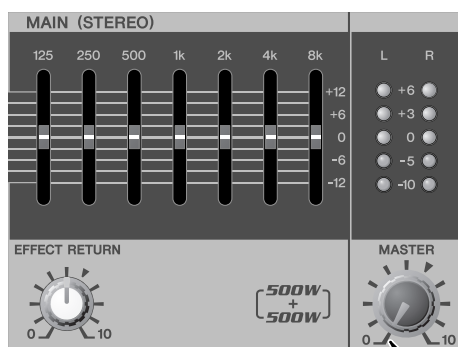


Never connect both A and B jacks to a single speaker. Connection of both jacks to the same speaker may result in damage to the mixer.

2 Turn the LEVEL knobs and the MASTER knobs to 0.



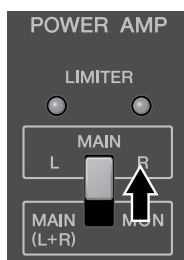
This position





This position

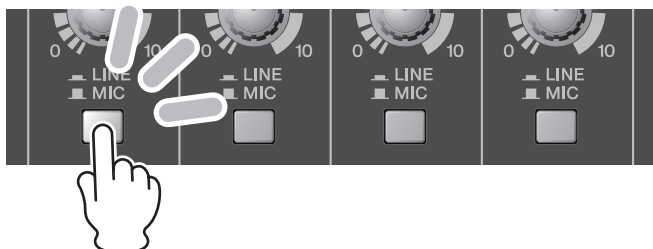
3 Set the POWER AMP switch to its upper position (to MAIN L-R).

For information about this switch, see page 25.



4 If you have connected input devices to channels 1 to 4, set the LINE/MIC switch on each channel accordingly.

If you have connected a line-level device, such as a keyboard or audio device, set the channel's switch to the LINE position (). If you have connected a microphone or other mic-level device, set the switch to the MIC position ().



5 If you are using one or more condenser microphones for your inputs, set the PHANTOM switch to the ON position ().



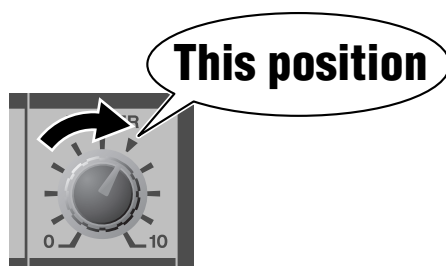
6 Turn on the power.

First turn on the power to all connected devices other than powered speakers and amp, and then turn on the EMX itself. If using powered speakers or amps, turn these on last.



- Be sure to leave this switch off if you do not need phantom power.
- When using phantom power, do not connect any devices other than condenser microphones to the XLR input jacks. Other devices may be damaged if connected to phantom power. This precaution does not apply to balanced dynamic microphones, however, as these will not be affected by phantom power.
- Before turning the PHANTOM switch ON or OFF, be sure to turn off the power to the mixer and to all other devices having internal amplifiers. It is also recommended that you set both MASTER knobs to their "0" position. Neglect of these precautions may result in damage to speakers, to other equipment, or to your ears.

- 7** Turn the **MASTER** knob in the **MAIN** section to the **►** position.



- 8** Adjust the **LEVEL** knobs for all occupied channels.

For each input device you have connected: Generate sound from the device while adjusting the corresponding channel's **LEVEL** knob. Adjust so that the **LEVEL** meter occasionally reaches the "0" level.



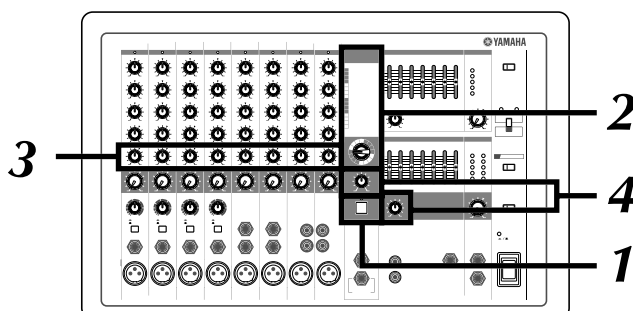
- 9** Now turn the **MASTER** knob in the **MAIN** section again as necessary to adjust the overall output level.



It is acceptable for the **LIMITER** lamps to flash on briefly at times, but if they remain lit continuously then there is risk of damage to your speakers or to the internal amp. Reduce the **MASTER** knob setting so that these lamps do not stay on.

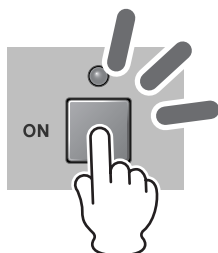
Adding Some Reverb

Now let's try adding some reverb to your input. The reverb effects let you simulate the sound of different performance environments—such as concert halls and small clubs.



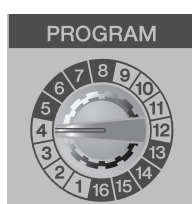
1 Turn the ON switch to its ON position.

This switch turns the internal effector on and off. The lamp lights up orange to indicate that the effector is on. As an alternative to the ON switch, you can use a separately sold FC5 foot switch to toggle the effector on and off.



2 Turn the PROGRAM dial to select the desired effect type;

To select a reverb effect, turn the dial to any value from 1 to 7.

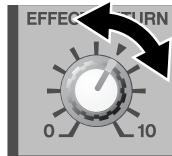


1	REVERB HALL 1	9	KARAOKE ECHO
2	REVERB HALL 2	10	VOCAL ECHO
3	REVERB ROOM 1	11	CHORUS 1
4	REVERB ROOM 2	12	CHORUS 2
5	REVERB STAGE 1	13	FLANGER
6	REVERB STAGE 2	14	PHASER
7	REVERB PLATE	15	AUTO WAH
8	DRUM AMBIENCE	16	DISTORTION

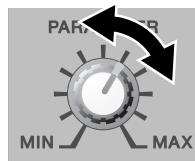
3 Use the channel EFFECT knobs to adjust the effect depth for each channel.



- 4** Use the MAIN section's EFFECT RTN knob to adjust the overall effect depth.

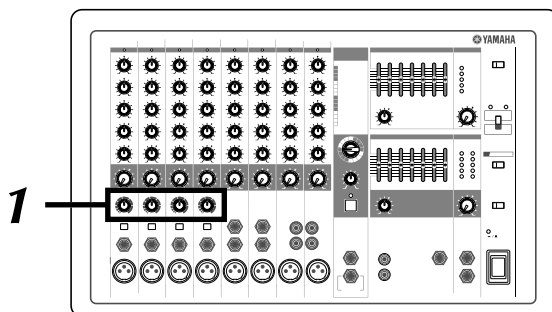


Note that you can use the PARAMETER knob to adjust the characteristic sound of the selected effect. If you have selected a reverb effect, the knob will adjust the reverb time.



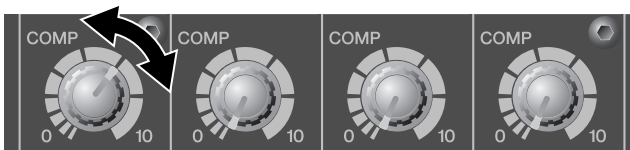
Using the Compressors to Enhance Vocals (EMX512SC and EMX312SC only)

The compressor evens out the input level, reducing the level of loud passages and bringing up softer passages. The result is a cleaner sound where nuances remain audible and the lyrics are easier to hear.



- 1** Adjust the COMP knobs on the relevant channels.

Turn the knob clockwise to increase the compression. Avoid setting the value too high, as too much compression may lead to howling. For more information about the compressors, see pages 18 and 21.



Making the Most of Your Mixer

An Introduction

You've got yourself a mixer and now you're ready to use it. Just plug everything in, twiddle the controls, and away you go ... right? Well, if you've done this before you won't have any problems, but if this is the first time you've ever used a mixer you might want to read through this little tutorial and pick up a few basics that will help you get better performance and make better mixes.

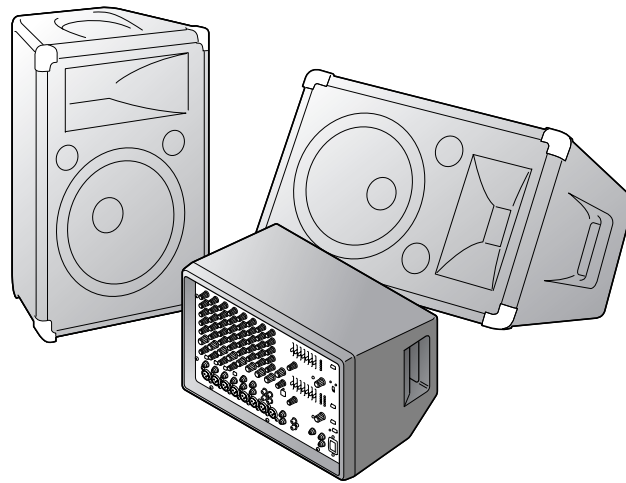
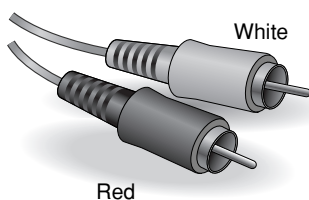
A Place for Everything and Everything in its Place

A Plethora of Connectors—What Goes Where?

Questions you're likely to encounter when setting up a system for the first time might include "Why all these different types of connectors on the back of my mixer?" and "What's the difference?"

Let's start by taking a look at the most common connector types.

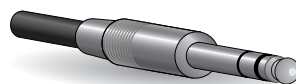
The Venerable RCA Pin Jack



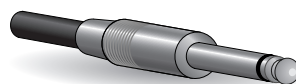
This is the "consumer connector," and the one that has been most commonly used on home audio gear for many years. Also known as "phono" jacks (short for "phonogram"), but the term isn't used much these days—besides, it's too easily confusable with "phone" jacks, below. RCA pin jacks are always unbalanced, and generally carry a line-level signal at -10 dB, nominal. You're most likely to use this type of connector when connecting a CD player or other home audio type source to your mixer, or when connecting the output of your mixer to a cassette recorder or similar gear.

designed to handle just by looking at them. It could be unbalanced mono, unbalanced stereo, balanced mono, or an insert patch point. The connector's label will usually tell you what type of signal it handles, as will the owner's manual (you *do* keep your manuals in a safe place, don't you?). A phone jack that is set up to handle balanced signals is also often referred to as a "TRS" phone jack. "TRS" stands for Tip-Ring-Sleeve, which describes the configuration of the phone plug used.

The Versatile Phone Jack



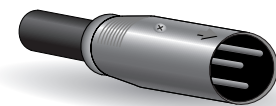
Stereo/TRS phone plug



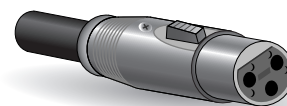
Mono phone plug

The name "phone jack" arose simply because this configuration was first used in telephone switchboards. Phone jacks can be tricky because you can't always tell what type of signal they're

The Sturdy XLR



Male



Female

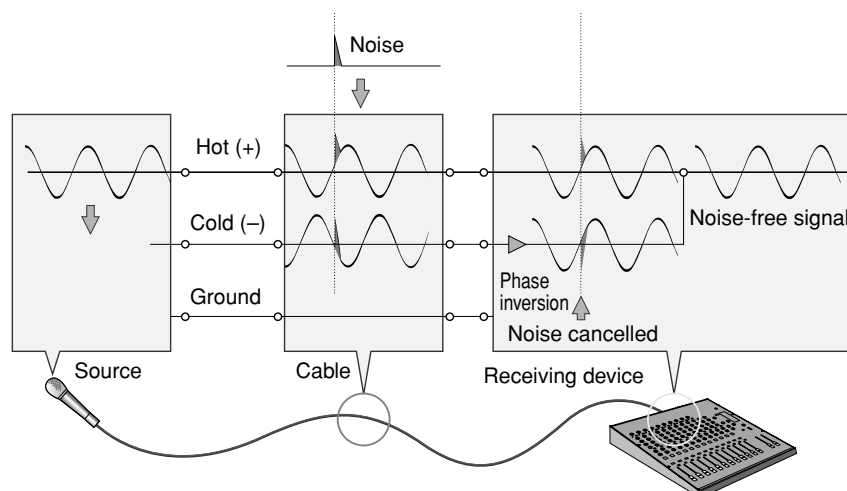
This type of connector is generally referred to as "XLR-type," and almost always carries a balanced signal. If the corresponding circuitry is designed properly, however, XLR-

type connectors will also handle unbalanced signals with no problem. Microphone cables usually have this type of connector, as do the inputs and outputs of most professional audio gear.

Balanced, Unbalanced—What's the Difference?

In a word: “noise.” The whole point of balanced lines is noise rejection, and it's something they're very good at. Any length of wire will act as an antenna to pick up the random electromagnetic radiation we're constantly surrounded by: radio and TV signals as well as spurious electromagnetic noise generated by power lines, motors, electric appliances, computer monitors, and a variety of other sources. The longer the wire, the more noise it is likely to pick up. That's why balanced lines are the best choice for long cable runs. If your “studio” is basically confined to your desktop and all connections are no more than a meter or two in length, then unbalanced lines are fine—unless you're surrounded by extremely high levels of electromagnetic noise. Another place balanced lines are almost always used is in microphone cables. The reason for this is that the output signal from most microphones is very small, so even a tiny amount of noise will be relatively large, and will be amplified to an alarming

Balanced noise cancellation



degree in the mixer's high-gain head amplifier.

How Do Balanced Lines Reject Noise?

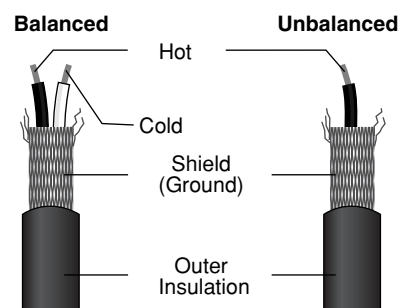
*** Skip this section if technical details make you queasy. ***

Balanced lines work on the principle of “phase cancellation”: if you add two identical signals out of phase (i.e. one signal is inverted so its peaks coincide with the troughs in the other signal), the result is ... nothing. A flat line. The signals cancel each other out.

A balanced cable has three conductors:

- 1) A ground conductor which carries no signal, just the “ground” or “0” reference against which the signal in the other conductors fluctuates.

- 2) A “hot” or “+” conductor which carries the normal-phase audio signal.
- 3) A “cold” or “-” conductor which carries the reverse-phase audio signal.

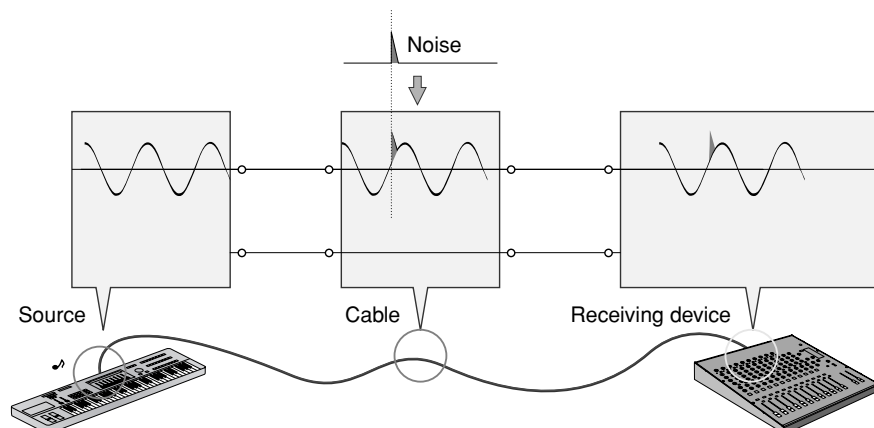


While the desired audio signals in the hot and cold conductors are out of phase, any noise induced in the line will be exactly the same in both conductors, and thus in phase. The trick is that the phase of one signal is reversed at the receiving end of the line so that the desired audio signals become in-phase, and the induced noise suddenly finds itself out of phase. The out-of-phase noise signal is effectively canceled while the audio signal is left intact. Clever, eh?

To summarize

Microphones:	Use balanced lines.
Short line-level runs:	Unbalanced lines are fine if you're in a relatively noise-free environment.
Long line-level runs:	The ambient electromagnetic noise level will be the ultimate deciding factor, but balanced is best.

Unbalanced noise



Signal Levels and the Decibel

Let's take a look at one of the most commonly used units in audio: the decibel (dB). If the smallest sound that can be heard by the human ear is given an arbitrary value of 1, then the loudest sound that can be heard is approximately 1,000,000 (one million) times louder. That's too many digits to deal with for practical calculations, and so the more appropriate "decibel" (dB) unit was created for sound-related measurements. In this system the difference between the softest and loudest sounds that can be heard is 120 dB. This is a non-linear scale, and a difference of 3 dB actually results in a doubling or halving of the loudness.

You might encounter a number of different varieties of the dB: dBu, dBV, dBm and others, but the dBu is the basic decibel unit. In the case of dBu, "0 dBu" is specified as a signal level of 0.775 volts. For example, if a microphone's output level is -40 dBu (0.00775 V), then to raise that level to 0 dBu (0.775 V) in the mixer's preamp stage requires that the signal be amplified by 100 times.

A mixer may be required to handle signals at a wide range of

levels, and it is necessary match input and output levels as closely as possible. In most cases the "nominal" level for a mixer's input and outputs is marked on the panel or listed in the owner's manual.

Making Better Mixes

Approaching the Mix—Where Do You Start?

Mixing is easy, right? Just move the faders around until it sounds right? Well, you can do it that

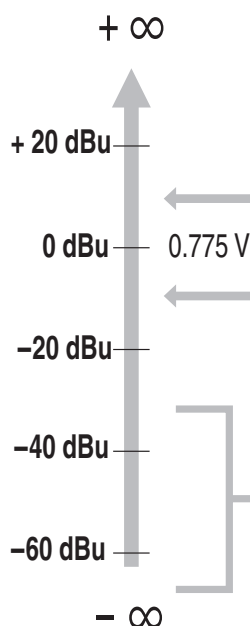
way, but a more systematic approach that is suited to the material you're mixing will produce much better results, and faster. There are no rules, and you'll probably end up developing a system that works best for you. But the key is to *develop a system* rather than working haphazardly. Here are a few ideas to get you started:

Faders Down

It might sound overly simple, but it is usually a good idea to start with all channel faders off—all the way down. It's also possible to start with all faders at their nominal settings, but it's too easy to lose perspective with this approach. Start with all faders down, then bring them up one by one to fill out the mix. But which channel should you start with?

Example 1: Vocal Ballad Backed by Piano Trio

What are you mixing? Is it a song in which the vocals are the most important element?



Most professional mixers, power amplifiers, and other types of equipment have inputs and outputs with a nominal level of **+4 dBu**.

The inputs and outputs on home-use audio gear usually have a nominal level of **-10 dBu**.

Microphone signal levels vary over a wide range depending on the type of microphone and the source. Average speech is about **-30 dBu**, but the twittering of a bird might be lower than **-50 dBu** while a solid bass drum beat might produce a level as high as **0 dBu**.

If so you might want to build the mix around the vocals. This means bringing the vocal channel up to nominal first (if your level setup procedure has been done properly this will be a good starting point), and then adding the other instruments.

What you add next will depend on the type of material you are working with and your



approach to it. If the vocals are backed by a piano trio and the song is a ballad, for example, you might want to bring in the piano next and get the vocal/piano relationship just right, then bring in the bass and drums to support the overall sound.

Example2: Funky R&B Groove

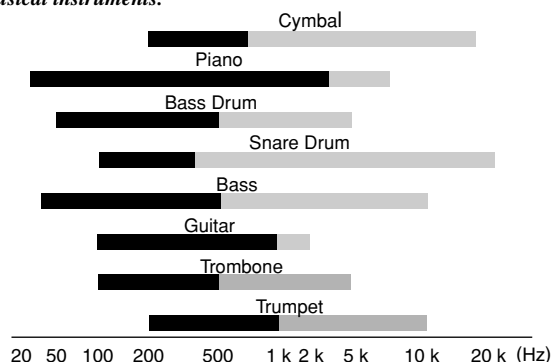


The approach will be totally different if you're mixing a funky R&B number that centers on the groove. In this case most engineers will start with the drums, and then add the bass. The relationship between the drums and bass is extremely important to achieve the "drive" or groove the music rides on. Pay particular attention to how the bass works with the kick (bass drum).

They should almost sound like a single instrument—with the kick supplying the punch and the bass supplying the pitch. Once again, there are no rules, but these are concepts that have been proven to work well.



The fundamental ■ and harmonic ■ frequency ranges of some musical instruments.



- Fundamental: The frequency that determines the basic musical pitch.
- Harmonics: Multiples of the fundamental frequency that play a role in determining the timbre of the instrument.

Some Frequency Facts

The lowest and highest frequencies than can be heard by the human ear are generally considered to be around 20 Hz and 20,000 Hz, respectively. Average conversation occurs in the range from about 300 Hz to about 3,000 Hz. The frequency of a standard pitchfork used to tune guitars and other instruments is 440 Hz (this corresponds to the "A3" key on a piano tuned to concert pitch). Double this frequency to 880 Hz and you have a pitch one octave higher (i.e. "A4" on the piano keyboard). In the same way you can halve the frequency to 220 Hz to produce "A2" an octave lower.

The frequencies controlled by the LOW, MID, and HIGH bands on this mixer have been specifically selected to provide the most "musical" range of adjustment with the widest possible range of instruments (100Hz, 2,500 Hz, and 10,000 Hz, respectively).

To EQ or Not to EQ

In general: less is better. There are many situations in which you'll need to cut certain frequency ranges, but use boost sparingly, and with caution. Proper use of EQ can eliminate interference between instruments in a mix and give the overall sound better definition. Bad EQ—and most commonly bad boost—just sounds terrible.

Cut for a Cleaner Mix

For example: cymbals have a lot of energy in the mid and low frequency ranges that you don't really perceive as musical sound, but which can interfere with the clarity of other instruments in these ranges. You can basically turn the low EQ on cymbal channels all the way down without changing the way they sound in the mix. You'll hear the difference, however, in the way the mix sounds more "spacious," and instruments in the lower ranges will have better definition. Surprisingly enough, piano also

has an incredibly powerful low end that can benefit from a bit of low-frequency roll-off to let other instruments—notably drums and bass—do their jobs more effectively. Naturally you won't want to do this if the piano is playing solo.

The reverse applies to kick drums and bass guitars: you can often roll off the high end to create more space in the mix without compromising the character of the instruments. You'll have to use your ears, though, because each instrument is different and sometimes you'll want the "snap" of a bass guitar, for example, to come through.

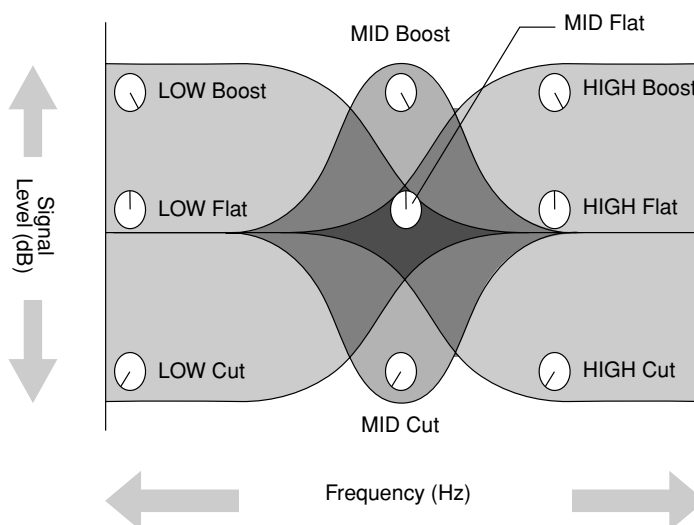
Boost with Caution

If you're trying to create special or unusual effects, go ahead and boost away as much as you like. But if you're just trying to achieve a good-sounding mix, boost only in very small increments. A tiny boost in the midrange can give vocals more presence, or a touch of high boost can give certain instruments more "air." Listen, and if things don't sound clear and clean try using cut to remove frequencies that are cluttering up the mix rather than trying to boost the mix into clarity.

One of the biggest problems with too much boost is that it adds gain to the signal, increasing noise and potentially overloading the subsequent circuitry.

Ambience

Your mixes can be further refined by adding ambience effects such as reverb or delay. On the EMX mixers these effects are built in. The internal DSP (Digital Signal Processor) can be used to add reverb or delay to individual channels in the same way as external effects processors, with the extra connections required by, or the loss in sound quality often



caused by external processing. (Refer to page 22).

You need to be careful not to overdo effects, however, because going to far can undermine the clarity and quality of your mix. Use your ambience effects just enough to create the required feeling of depth, but no more than is necessary to keep your sound clean.

Reverb and Delay Time

A variety of reverb and delay effect programs are provided, and nearly all of them have a reverb/delay time parameter that can be adjusted via the panel PARAMETER control.

Small adjustments to the reverb/delay time can actually have a significant effect on the sound. The optimum reverb time for a piece of music will depend on the music's demo and density, but as a general rule longer reverb times are good for ballads, while shorter reverb times are more suited to up-tempo tunes. Delay times can be adjusted to create a wide variety of "grooves", and you need to select the time that best suits the music. When adding delay to a vocal, for example, try

setting the delay time to dotted eighth notes corresponding to the tune's tempo.

Reverb Tone

Different reverb programs will have different "reverb tone" due to differences in the reverb time of the high or low frequencies, or differences in the overall frequency response of the reverb sound. Always be careful not to apply too much reverb, particularly in the high frequencies. In addition to resulting in unnatural sound, excessive high-frequency reverb can interfere with the high frequencies in other parts of the mix. If you can hear more reverb than direct sound in the upper frequency range, try selecting a different effect program. It's always a good idea to choose a reverb program that gives you the depth you want without detracting from the clarity of the mix.

Reverb Level

It's amazing how quickly your ears can lose perspective and fool you into believing that a totally washed-out mix sounds perfectly fine. To avoid falling into this trap start with reverb level all

the way down, then gradually bring the reverb into the mix until you can just hear the difference. Any more than this normally becomes a “special effect.” You don’t want reverb to dominate the mix unless you are trying to create the effect of a band in a cave—which is a perfectly legitimate creative goal if that’s the sort of thing you’re aiming for.

The Modulation Effects: Phasing, Chorus, and Flanging

All of these effects work on basically the same principle: a portion of the audio signal is “time-shifted” and then mixed back with the direct signal. The amount of time shift is controlled, or “modulated”, by an LFO (Low-frequency Oscillator). When we say “time shift,” however, we’re not talking in terms of minutes or even seconds.

For phasing effects the shift is very small indeed – a difference measured in degrees of phase shift rather than time units. The phase difference between the modulated and direct signals causes cancellation at some frequencies and reinforces the signal at others – a “comb filter” effect – and this causes the shimmering sound we hear. Phasing is the subtlest of all these effects, producing a gentle shimmer that can add life to a wide range of sources without being too obtrusive.

For chorus and flanging the signal is actually delayed by several milliseconds (a millisecond is a thousandth of a second), with the delay time modulated by an LFO, and recombined with the direct signal. In addition to the comb-filter effect described above, the delay modulation in these effects causes a perceived pitch shift which, when mixed with the direct

signal, results in a harmonically rich swirling or swishing sound. The difference between chorus and flanging effects is primarily in the amount of delay time and feedback used – flanging uses longer delay times than chorus, whereas chorus generally uses a more complex delay structure. Chorus is most often used to thicken the sound of an instrument, while flanging is usually used as an outright “special effect” to produce other-worldly sonic swoops.

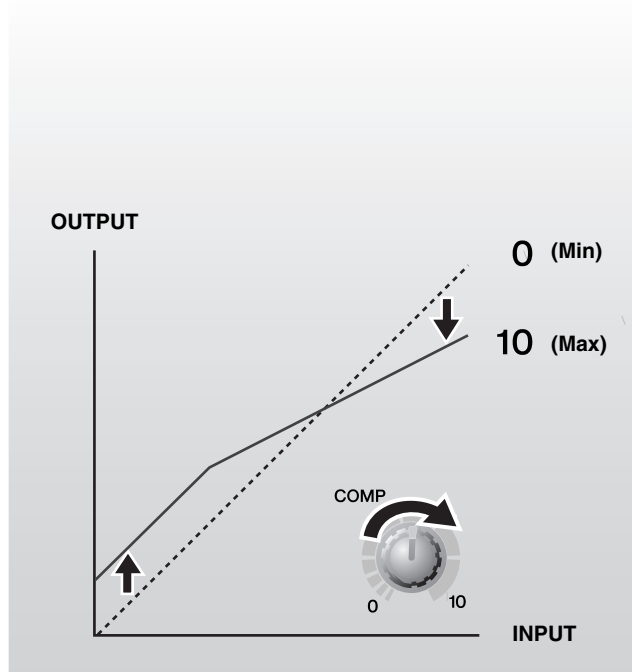
Compression

Have you ever wondered why professionally produced recordings sound so different from your own? There are numerous reasons, of course, but one important factor is the judicious use of compression.

One form of compression known as “limiting” can, when properly used, produce a smooth, unified sound with no excessive peaks or distortion. Compression can also

be used within a mix to make a voice or instrument seem to come forward, or simply to even out level differences. Compression can be used to make a mix seem bigger and louder by producing a more “saturated” sound. Professional compressors have numerous parameters that need to be carefully adjusted: attack, release, threshold, level, and sometimes more. A professional sound engineer might need to spend a considerable amount of time, based on a considerable amount of experience, to set each of these parameters to achieve the desired sound.

The EMX compressor makes achieving great sound much easier. All you need to do is set a single “compression” control and all of the pertinent parameters are automatically adjusted for you. The engineers who designed this fine compressor paid careful attention to achieving the best sound quality possible so that you can quickly achieve pro-quality compression without having to



worry about a confusing multitude of settings.

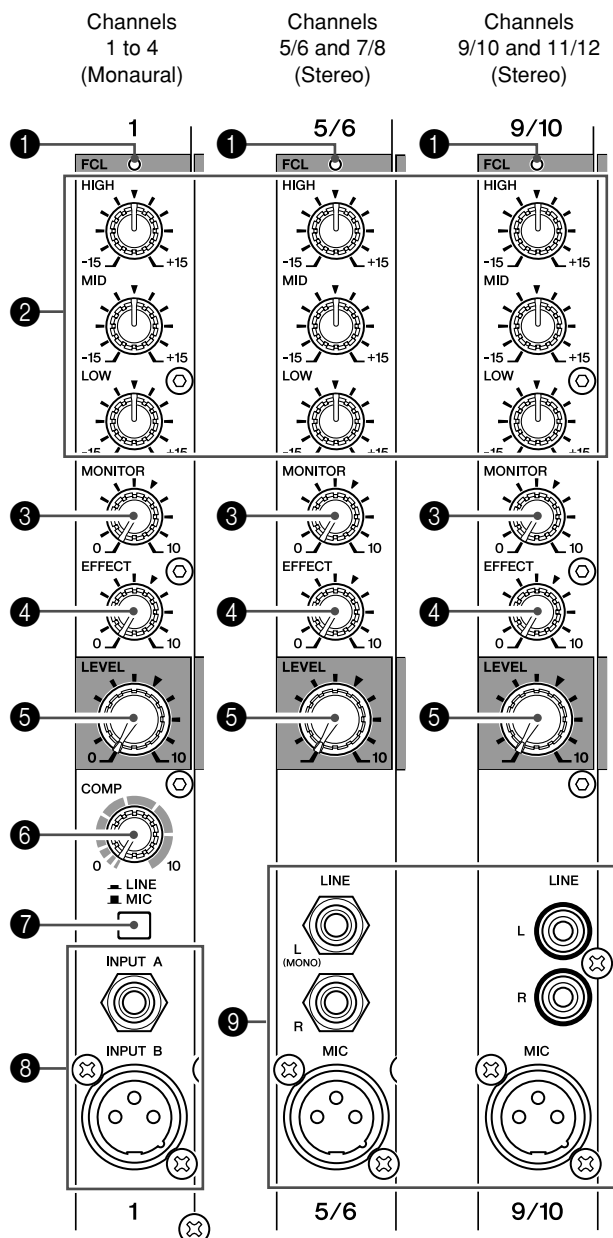
A common example of the use of compression is to “tame” a vocal that has a wide dynamic range in order to tighten up the mix. With the right amount of compression you’ll be able to clearly hear whispered passages while passionate shouts are still well balanced in the mix. Compression can also be valuable on bass guitar, producing a smooth bass sound that stays solid through the tune. Compression can also be applied to guitar tracks to add extra sustain. Too much compression can be a cause of feedback, however, so use it sparingly.

Music First—Then Mix

In any case, the music comes first. Think about the music and let it guide the mix, rather than trying to do things the other way around. What is the music saying and what instrument or technique is being used to drive the message? That’s where the focus of your mix should be. You’re using a high-tech tool to do the mixing, but the mix itself is as much art as the music. Approach it that way and your mixes will become a vital part of the music.

Controls and Connectors

Controls on Each Channel



1 FCL (Feedback Channel Locating) lamp

This lamp is used during setup to identify any channel that might be howling. Check these lamps when setting up for a performance. If the lamp lights up, adjust the channels equalizer **2** or level knob **5** to reduce the level so that the lamp goes off.

NOTE Input of a continuous sound (as from a CD player or vocal) may cause the lamp to come on even in the absence of howling.

2 Equalizer (HIGH, MID, and LOW)

This three-band equalizer adjusts the channel's high, mid, and low frequency bands. Setting the knob to the ▼ position produces a flat frequency response. Turning the knob to the right boosts the corresponding frequency band, while turning to the left attenuates the band. The following table shows the equalization type, the base frequency, and the maximum cut/boost for each of the three bands.

Band	Type	Base Frequency	Maximum Cut/Boost
HIGH	Shelving	10 kHz	±15 dB
MID	Peaking	2.5 kHz	
LOW	Shelving	100 Hz	

3 MONITOR control

Adjusts the level of the signal sent from the channel into the MONITOR bus. If input is from a stereo channel pair (5/6, 7/8, 9/10, or 11/12), the signals from the L and R channels are mixed before moving into the bus. The MONITOR bus signal is output at the MONITOR OUT jack **25**, and may also be output from the SPEAKERS A jacks **32** (depending on the setting of the POWER AMP switch **28**).

NOTE The channel's LEVEL knob **5** has no effect on the level of the signal sent into the MONITOR bus.

4 EFFECT knob

Adjusts the level of the signal sent from the channel into the EFFECT bus. If input is from a stereo channel pair (5/6, 7/8, 9/10, or 11/12), the signals from the L and R channels are mixed before moving into the bus. The EFFECT bus signal is fed both to the internal digital effector and to the EFFECT OUT jack **13**.

NOTE The channel's LEVEL knob **5** also affects the level of the channel's signal into the EFFECT bus.

5 LEVEL knob



Adjusts the signal's output level. Use these knobs to adjust the volume balance among the various channels.

NOTE To reduce noise, set the knobs for unused channels to "0".

6 COMP knob (EMX512SC and EMX312SC only)

This knob adjusts the level of compression applied to the channel. As the knob is turned to the right, the mixer automatically raises the compression ratio while adjusting the output gain accordingly. The result is a narrower, more even dynamic range, as louder signals are softened while the overall level is boosted. Avoid setting the knob too high, however, as excess compression may lead to howling.

7 LINE/MIC switch (Channels 1 to 4)

Set this switch to match the type of input signal you are supplying—either a mic-level (low level) signal or a line-level (high level) signal. Set the switch to **LINE** () if you are connecting a line-level source, such as a keyboard or audio device. Set it to **MIC** () if you are connecting a microphone or other mic-level source.

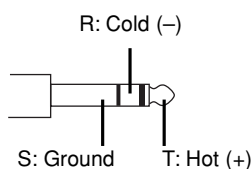


To avoid damage to speakers, be sure to turn off the power to the EMX itself and to any other power amplifiers and power speakers before setting this switch to **LINE** or **MIC**. We also recommend that you turn all output controls (LEVEL knobs, MASTER knobs, etc.) to minimum settings before operating the switch, to avoid risk of loud noises that could cause hearing loss or device damage.

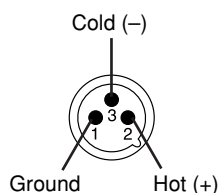
8 INPUT A and INPUT B jacks (Channels 1 to 4)

You can connect an input source to either jack. Be sure to set the **LINE/MIC switch** **7** to match the type of device you are connecting.

INPUT A: TRS phone-type balanced line input (T: hot, R: cold, S: ground). Accepts both balanced and unbalanced line input.



INPUT B: XLR balanced mic input (1: ground, 2: hot, 3: cold). If you are connecting a condenser microphone, be sure to turn the **PHANTOM switch** **26** to its ON position.



- NOTE**
- You cannot use both jacks at the same time.
 - The signal into an **INPUT** jack is sent in equal levels to the **MAIN L** and **MAIN R** buses.

9 LINE and MIC jacks (Channels 5/6 to 11/12)

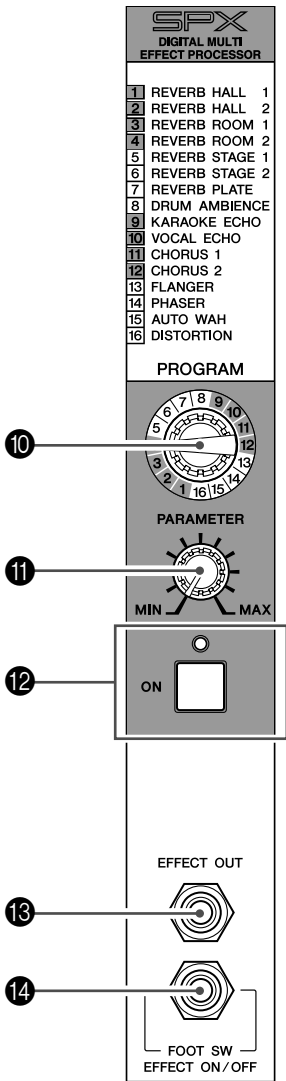
These jacks accept stereo inputs. Use these to connect up stereo output devices, such as stereo synthesizers and CD players.

LINE jacks: Unbalanced stereo inputs. On channel pairs 5/6 and 7/8 these are phone jacks; on channel pairs 9/10 and 11/12 they are RCA pin jacks.

MIC jack: XLR balanced stereo mic-level input jack. If you are connecting a condenser microphone, be sure to turn the **PHANTOM switch** **26** to its ON position.

- NOTE**
- If you wish, you may use the channel pair's **LINE** and **MIC** jacks together at the same time. But note that the levels cannot be adjusted independently.
 - Signals into **LINE L** and **LINE R** jacks are sent independently to the corresponding **MAIN L** and **R** buses.
 - The signal into a **MIC** jack is sent in equal levels to the **MAIN L** and **MAIN R** buses.

Digital Effects Section



10 PROGRAM dial

Selects the type of effect to be used. You can select from 16 different effect types, as follows.

No.	Program	Parameter
1	REVERB HALL 1	REVERB TIME
2	REVERB HALL 2	REVERB TIME
3	REVERB ROOM 1	REVERB TIME
4	REVERB ROOM 2	REVERB TIME
5	REVERB STAGE 1	REVERB TIME
6	REVERB STAGE 2	REVERB TIME
7	REVERB PLATE	REVERB TIME
8	DRUM AMBIENCE	REVERB TIME

No.	Program	Parameter
9	KARAOKE ECHO	DELAY TIME
10	VOCAL ECHO	DELAY TIME
11	CHORUS 1	LFO FREQ
12	CHORUS 2	LFO FREQ
13	FLANGER	LFO FREQ
14	PHASER	LFO FREQ
15	AUTO WAH	LFO FREQ
16	DISTORTION	DRIVE

11 PARAMETER knob

Adjusts the parameter (depth, speed, etc.) associated with the selected effect type.

NOTE The mixer saves the last value used with each effect type. When you change to a different effect type, the mixer automatically restores the value that was previously used with that type (regardless of the current position of the PARAMETER knob). But note that all values return to their defaults at power-off.

12 ON switch

Switches use of the internal effector on or off. The internal effect is applied only if this switch is on. Note that the lamp above the switch lights up orange to indicate that the switch is on. As an alternative to the ON switch, you can use a separately sold FC5 foot switch to toggle the effector on and off.

NOTE The internal effector is automatically turned on whenever you switch on the mixer's power.

13 EFFECT OUT jack

This unbalanced phone output jack outputs the signal from the EFFECT bus. You can use this jack to output the signal to an external effector. You can then return the signal by connecting the external effector to any of the LINE jacks on channel pairs 5/6 to 11/12.

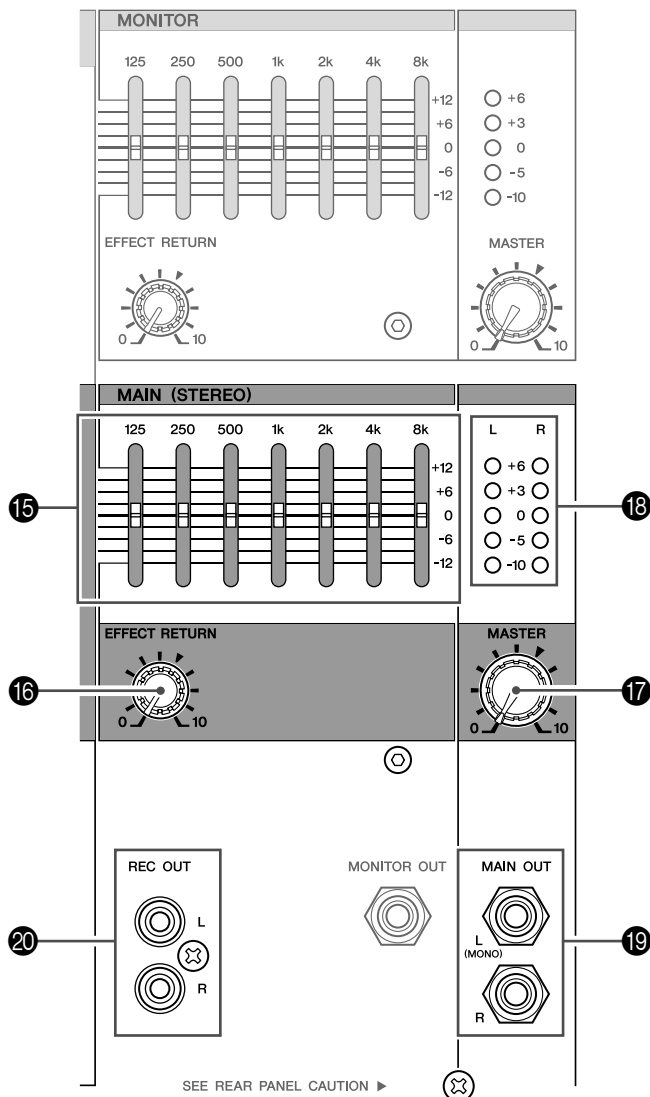


If you are returning a signal from an external effector into a LINE jack on any channel pair 5/6 to 11/12, please be sure to turn the EFFECT knob for that channel pair to "0".

14 FOOT SW jack

This phone input jack can connect to the (separately sold) YAMAHA FC5 foot switch. With the foot switch connected, you can use your foot to toggle the internal effector ON and OFF.

MAIN Section



15 Graphic Equalizer

This 7-band graphic equalizer adjusts the frequency characteristics of the stereo signal on the MAIN L and MAIN R buses. This is the signal that is output to the MAIN OUT jacks 19 and to the SPEAKERS jacks 32. Each band can be adjusted by ± 12 dB. The base frequencies for the bands are: 125, 250, 500, 1k, 2k, 4k and 8k Hz.

16 EFFECT RETURN knob

Adjusts the level of the signal sent from the internal effector to the MAIN L and MAIN R buses.

17 MASTER knob

Adjusts the level of the signal output to the SPEAKERS jacks 32 and MAIN OUT jacks 19.

18 LEVEL meters

The L and R meters show the level of the signal output from the MAIN OUT jack 19.



The MAIN OUT signal also passes through the internal power amp and is then output at the SPEAKERS jacks 32. Keep an eye on the LIMITER lamps 27 to ensure that the level at the SPEAKERS jacks does not stay too high.

19 MAIN OUT L and R jacks

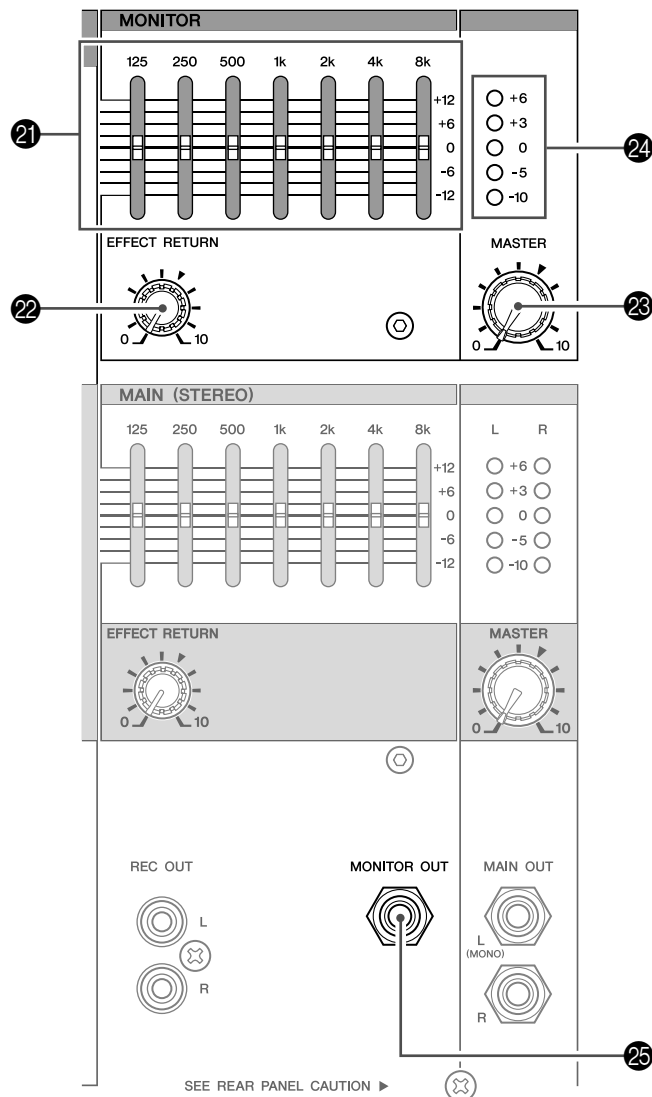
These unbalanced phone output jacks feed out the main stereo output. You would typically connect these jacks to a power amp or powered speakers. The signal sent to these jacks is adjusted by the MAIN section's MASTER knob 17 and graphic equalizer 15.

20 REC OUT L and R jacks

These RCA pin-type unbalanced output jacks can be used to send the main stereo signal to an external DAT recorder or cassette recorder. Note that unlike the output from the MAIN OUT jacks, the signal from the REC OUT jacks is not adjusted by the MAIN section's MASTER knob 17 and graphic equalizer 15.

NOTE Since this output signal is not adjusted by the MAIN section's MASTER knob 17, you should adjust the level as necessary at the recording side.

MONITOR Section



21 Graphic Equalizer

This 7-band graphic equalizer adjusts the frequency characteristics of the monitor signal that feeds to the MONITOR OUT jack (25) and (if the POWER AMP switch is down) to the SPEAKERS B jacks (32). Each band can be adjusted by ± 12 dB. The base frequencies for the bands are: 125, 250, 500, 1k, 2k, 4k, and 8k Hz.

22 EFFECT RETURN knob

Adjusts the level of the signal sent from the internal effector to the MONITOR bus.

23 MASTER knob

Adjusts the level of the monitor signal sent to the MONITOR OUT jack (25) and (if the POWER AMP switch is down) to the SPEAKERS B jacks (32).

24 LEVEL meters

The L and R meters show the level of the signal output from the MONITOR OUT jack (25).

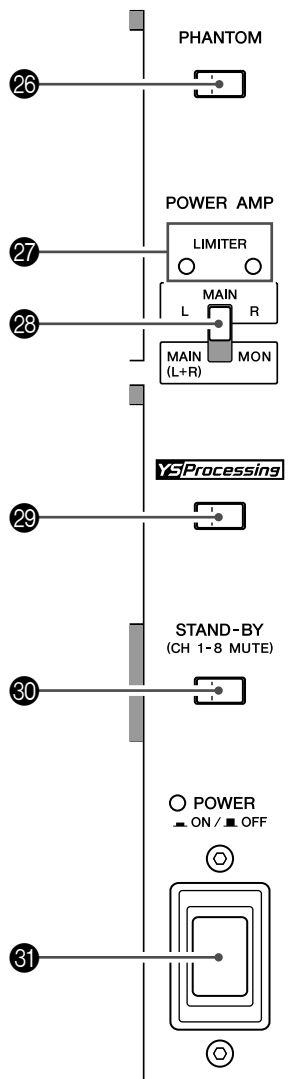


If the POWER AMP switch is down, the MONITOR OUT signal also passes through the internal power amp and is then output at SPEAKERS jacks B1 and B2 (32). Keep an eye on the LIMITER lamps (27) to ensure that the level at the SPEAKERS jacks does not stay too high.

25 MONITOR OUT jack

This unbalanced phone jack outputs the monaural monitor signal. You would typically connect this jack to powered speakers used for monitoring. The signal sent to this jack is adjusted by the MONITOR section's MASTER knob (23) and the settings of the MONITOR section's graphic equalizer (21).

POWER Section



26 PHANTOM switch

This switch toggles +15V phantom power on and off. If you set the switch on, the mixer supplies power to the XLR mic input jacks on all channels (the INPUT B jacks on channels 1 to 4, and the MIC jacks on channel pairs 5/6 to 11/12). Set this switch on when using one or more condenser microphones.

NOTE When this switch is on, the mixer supplies DC +15V power to pins 2 and 3 of all XLR input jacks.



- Be sure to leave this switch off if you do not need phantom power.
- When using phantom power, do not connect any devices other than condenser microphones to the XLR input jacks. Other devices may be damaged if connected to phantom power. This precaution does not apply to balanced dynamic microphones, however, as these will not be affected by phantom power.

- To avoid damage to speakers, be sure to turn off the power to the EMX itself and to any other power amplifiers and power speakers before switching phantom power on or off. We also recommend that you turn all output controls (LEVEL knobs, MASTER knobs, etc.) to minimum settings before operating the switch, to avoid risk of loud noises that could cause hearing loss or device damage.

27 LIMITER lamps

The lamp lights up when the amplified signal being output at the corresponding SPEAKERS jack hits its maximum value. The lamp indicates that the limiter has come on.



If the lamps are flashing frequently, the load on the amp is too high and there is risk of damage to your equipment. Reduce the setting of the MASTER knobs (17 and 23) until the lamps flash only briefly or not at all.

28 POWER AMP switch

Selects the output that gets sent to the SPEAKERS jacks, as follows.

Up (MAIN L/R):

SPEAKERS jacks A1 and A2 output the signal from the MAIN L bus, and SPEAKERS jack B1 and B2 output the signal from the MAIN R bus. The MAIN section's MASTER knob 17 adjusts the output level at all of the SPEAKERS jacks.

Down (MAIN(L+R)/MON):

SPEAKERS jacks A1 and A2 output a mix of the signals from the MAIN L and MAIN R buses. SPEAKERS jacks B1 and B2 output the signal from the MONITOR bus. The MAIN section's MASTER knob 17 adjusts the level to the A jacks, while the MONITOR section's MASTER knob 23 adjusts the level to the B jacks.

29 YS Processing switch

This switch turns Yamaha Speaker Processing on or off. The processor adjusts the speaker's bass ranges so as to compensate, for example, for lack of subwoofers. Note however that the resulting frequency balance will vary according to the speakers you are using.

30 STAND-BY switch

This switch mutes the input to channels 1 to 8. The switch lights up to indicate that the mute has been turned on. Note that the mute does not work on channels 9 to 12.

NOTE When using the mixer for live performances, you can fill in gaps in the performance by turning on the standby switch and feeding background music from a CD player or other such device into channels 9 to 12.

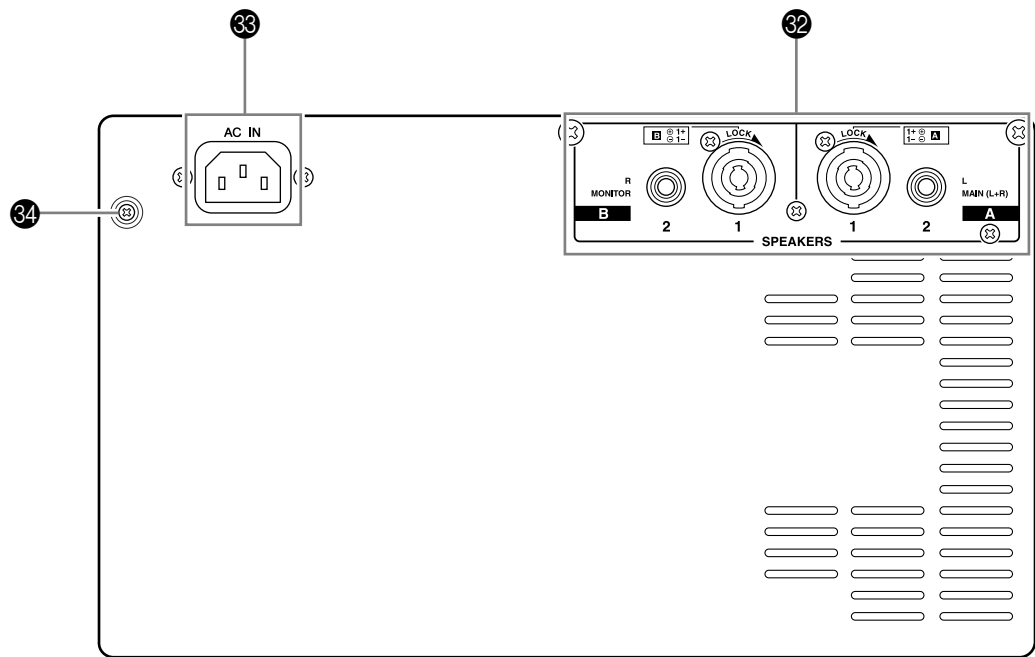
31 POWER switch and lamp

This switch turns the EMX power ON and OFF. The lamp lights up to indicate that the power is on.



Before turning the power ON or OFF, be sure to turn both MASTER knobs (17 and 23) to "0".

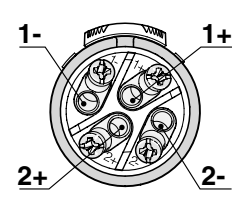
Rear Panel



32 SPEAKERS jacks

Use these jacks to connect to speakers. Note that the output directed to these jacks varies according to the setting of the POWER AMP switch 23.

A1, B1: Neutrik NL4 Speakon outputs. Polarities are as shown below.



Neutrik Plug	A1 and B1 Connectors
1+	⊕
1-	⊖
2+	
2-	

A2, B2: Phone output jacks.

33 AC IN connector

Connects to the included power cord. Connect one end of the cord to this connector, and then plug the other end into a standard power outlet.



Please use the cord that comes with the mixer. Use of a different cord may pose risk of fire, burns, or equipment damage.

34 Ground Screw

For maximum safety be sure to securely connect the EMX to an earth connection. The supplied power cable has a three-prong plug that will ground the unit when the plug is inserted into an appropriately grounded three-prong type AC mains outlet. If the AC outlet is not grounded, be sure to ground the unit by using this ground screw. Correct grounding will effectively eliminate hum noise and interference.

Connecting Speakers

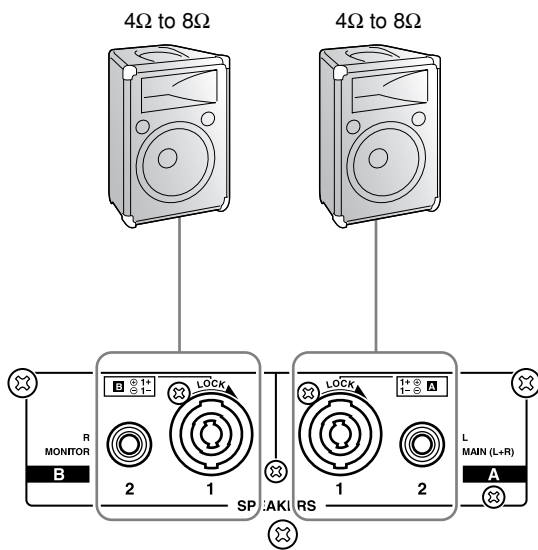
When making 2-channel and 2-channel parallel connections to the SPEAKERS jacks, be sure that the impedance of your speakers meets the conditions indicated below. Note that actual speaker impedance varies according to connection method and number of speakers.



When making connections, be sure that your cables have the appropriate ratings and the correct plugs. Be sure to use dedicated speaker cables when connecting speakers to the SPEAKERS jacks.

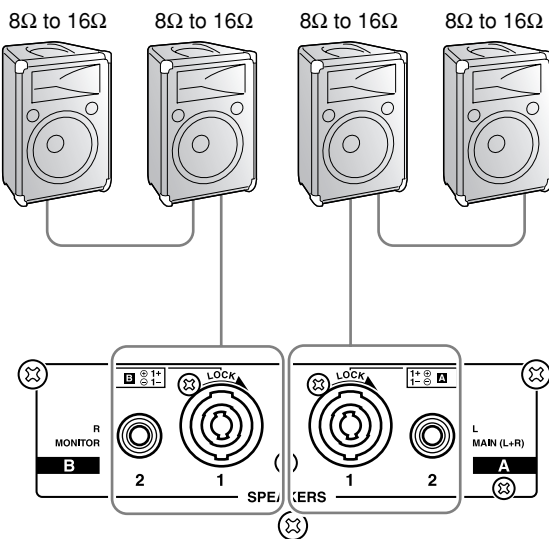
■ 2-channel connection

When connecting by 2-channel connection, use speakers with impedance of 4 ohms to 8 ohms.



■ 2-channel parallel connection

When connecting speakers in parallel as shown below, use speakers with impedance of 8 ohms to 16 ohms.



Horizontal Orientation, Tilting and Rack Mounting

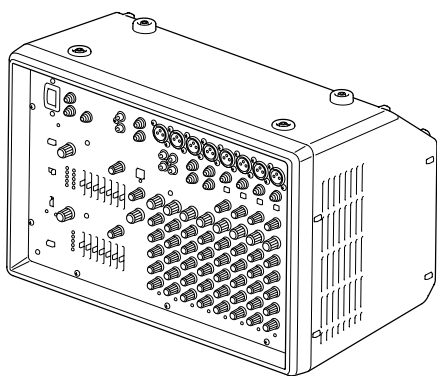
Horizontal Orientation

If you are going to position the EMX unit horizontally, be sure to attach the included rubber stabilizers before use. The stabilizers prevent the unit from tipping over.

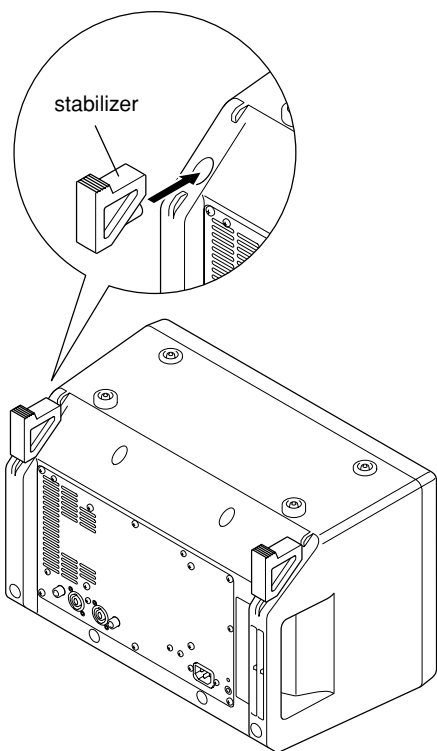
NOTE Please detach the stabilizers when transporting the unit.

■ How to attach the rubber stabilizers

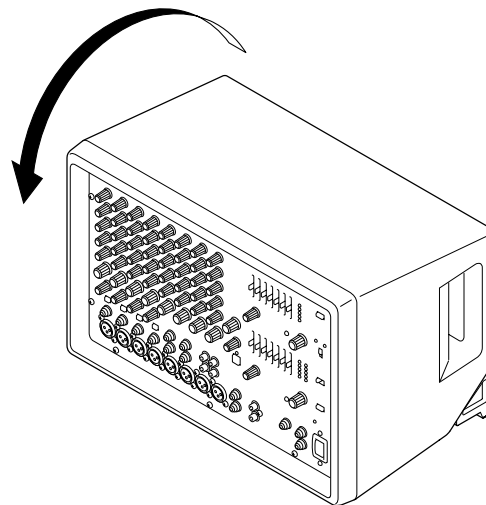
1 Turn the EMX unit upside down.



2 Attach the two rubber stabilizers that were included with the unit. Push each stabilizer all the way in so that they are firmly in place.

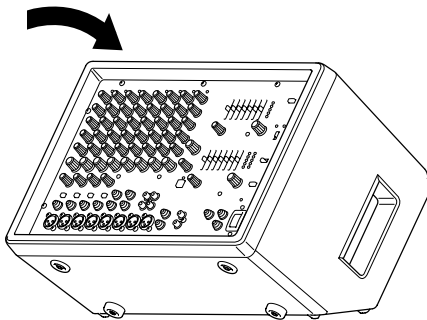


3 Turn the EMX right-side up.



Tilting

You can set the EMX unit at an angle, as shown below.



Do not push too forcefully when tilting the unit. Excess force may cause the unit to topple or turn, potentially resulting in equipment damage or in injury to bystanders.

Rack Mounting

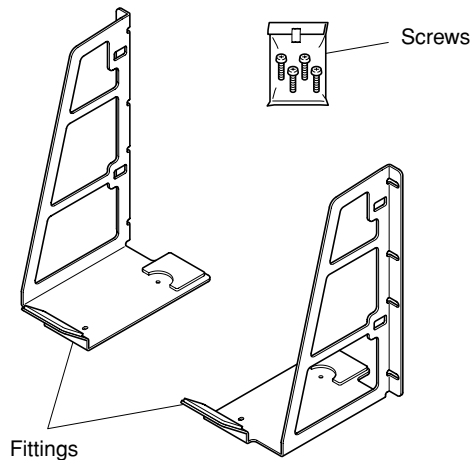
To prepare the unit for rack mounting, use the (separately sold) RK512 rack mount kit.



If rack-mounting the unit, be sure to maintain adequate ventilation so the unit does not overheat. Consider attaching a vent panel, and do not use a sealed rack.

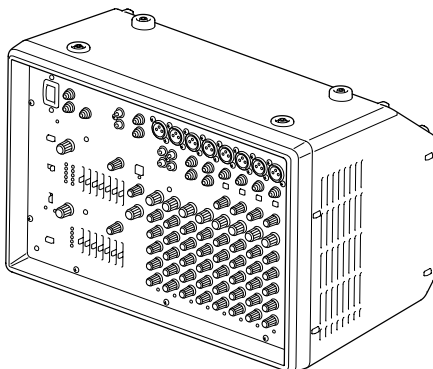
NOTE The EMX unit requires 7U of rack space.

RK512 Rack mount Kit

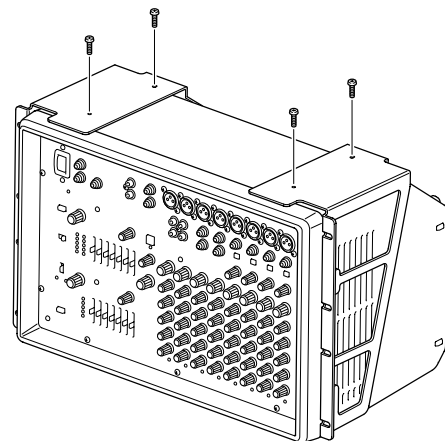


■ How to install the rack-mount hardware

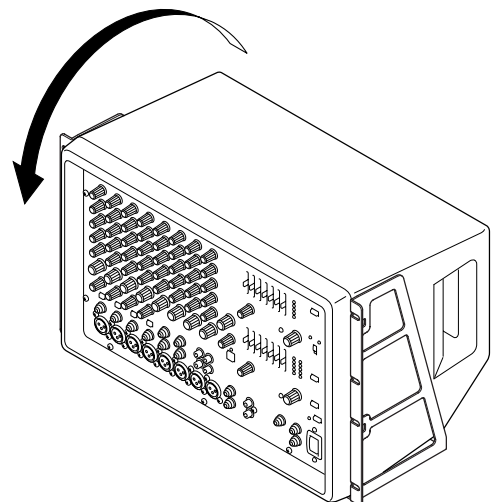
1 Turn the EMX unit upside down.



2 Using the kit's 4 screws, attach the kit's 2 metal fittings as shown below.

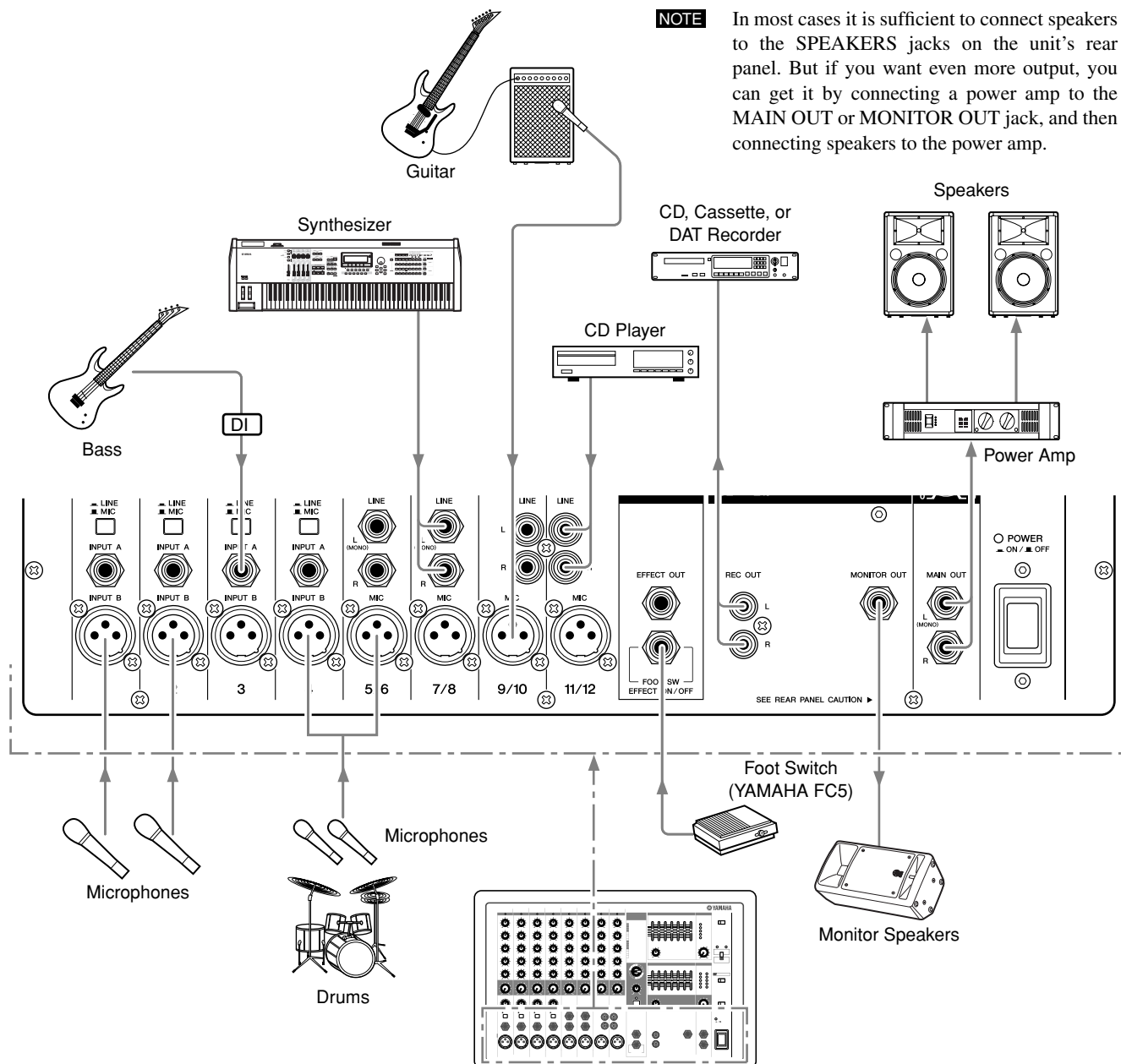


3 Turn the EMX right-side up.

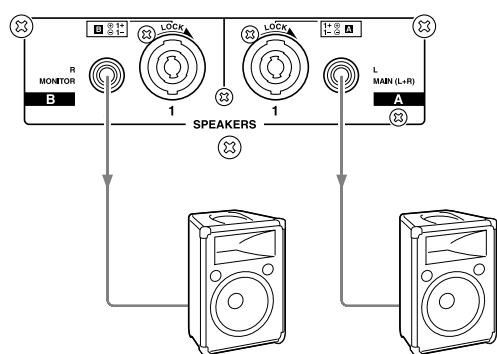


Setting Up

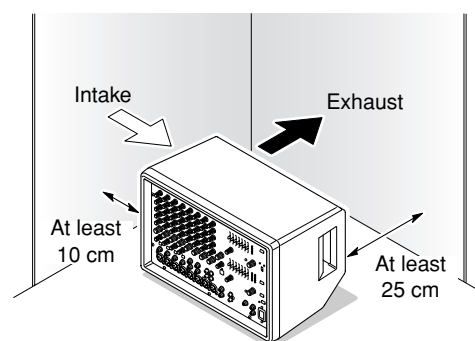
Top panel



Rear Panel



EMX Installation



Vents are located on the sides and rear of the EMX unit. Position the unit so that the vents are not blocked by nearby walls or objects.

Troubleshooting

■ Power doesn't come on.	<input type="checkbox"/> Be sure that you are using the supplied power cord, and that it is correctly connected to the AC IN connector and plugged into a working power outlet.
■ Power suddenly went off.	<input type="checkbox"/> Check whether the vents at the sides and rear of the unit are blocked. The EMX unit may overheat if the vents are blocked. If the unit overheats, the power may automatically go off. Wait for the unit to cool down, and then turn the power back on.
■ Sound suddenly stopped.	<input type="checkbox"/> Check whether the vents at the sides and rear of the unit are blocked. The EMX unit may overheat if the vents are blocked. If the unit overheats, it may cut off the output to the internal amp until things cool down.
■ No sound.	<input type="checkbox"/> Are microphones, external devices, and speakers connected correctly? <input type="checkbox"/> Are the channel LEVEL knobs and the two MASTER knobs set to appropriate levels? <input type="checkbox"/> Check that the speaker cables are not shorted. <input type="checkbox"/> If the above checks do not identify the problem, call Yamaha for service. (Refer to the end of this manual for a list of Yamaha dealers.)
■ Sound is faint, distorted, or noisy.	<input type="checkbox"/> Check that the channel LEVEL knobs and the two MASTER knobs are set appropriately. <input type="checkbox"/> Check that the LINE/MIC switches on channels 1 to 4 are set correctly. <input type="checkbox"/> On channels 1 to 4, be sure that you have not connected to both INPUT A and INPUT B. On each of these channels you may use one input or the other, but not both. <input type="checkbox"/> Is the input signal from the connected device set to an appropriate level?
■ An FCL lamp comes even though there is no howling on the channel.	<input type="checkbox"/> Input of a continuous sound (from a CD player or other such source) may cause the lamp to come on even in the absence of howling.
■ Can't hear the internal digital effect.	<input type="checkbox"/> Check that the EFFECT knob on each channel is correctly adjusted. <input type="checkbox"/> Be sure that the internal effector's ON switch is turned on. <input type="checkbox"/> Be sure that the EFFECT RETURN knobs in the MAIN and MONITOR sections are correctly adjusted.
■ The sound from the speakers seems dull. I want a more forceful sound.	<input type="checkbox"/> Try turning on the YS Processing switch. <input type="checkbox"/> Adjust the equalizers (HIGH, MID, and LOW knobs) on each channel. <input type="checkbox"/> Adjust the graphic equalizers.
■ I want spoken words to be heard more clearly.	<input type="checkbox"/> Be sure that the YS Processing switch is turned off. <input type="checkbox"/> Adjusting the equalizers (HIGH, MID, and LOW knobs) on each channel. <input type="checkbox"/> Adjusting the graphic equalizers.
■ I want to listen to monitor output.	<input type="checkbox"/> Connected a powered speaker to the MONITOR OUT jack. Then adjust the MONITOR OUT signal by adjusting the channel MONITOR knobs and the MONITOR section's MASTER knob. <input type="checkbox"/> If you want to send the monitor signal to SPEAKERS jacks B1 and B2, set the POWER AMP switch to the down position (to MAIN(L+R) / MON). Note that in this case the B jacks will output the monitor signal, and the A jacks will output a mix of the MAIN L and MAIN R signals.

Specifications

■ General Specifications

	Output		RL	Conditions		US	AU	EU	UNIT
Maximum Output Power	SPEAKERS OUT	EMX512SC	4 Ω	Both ch drive, 1 kHz, THD+N ≤ 0.5%	MIN	500	500	500	W
			8 Ω			350	350	320	
		EMX312SC	4 Ω			300	300	300	
			8 Ω			190	190	180	
		EMX212S	4 Ω			220	220	220	
			8 Ω			130	130	130	

	Input	Output	RL	Conditions	MIN	TYP	MAX	UNIT
Frequency Response	CH INPUT 1-11/12	MAIN OUT, MONITOR OUT, EFFECT OUT, REC OUT	10 kΩ	CH1-4 MIC/LINE: MIC 20 Hz-20 kHz, 0 dB @ 1 kHz	-3.0	0.0	1.0	dB
		SPEAKERS OUT	4 Ω		-3.0	0.0	1.0	
Maximum Voltage Gain@ 1 kHz	CH 1-4 INPUT B, CH 5/6-11/12 MIC	MAIN OUT, MONITOR OUT	10 kΩ	Rs=150 Ω CH1-4 MIC/LINE:MIC		65		dB
Gain Error @ 1 kHz It measures in each CH unit.	CH 1-4 INPUT B, CH 5/6-11/12 MIC	MAIN OUT	10 kΩ	Input level:-60 dBu CH1-4 MIC/LINE:MIC	2.0	4.0	6.0	dBu
		MONITOR OUT		Input level:-60 dBu CH1-4 MIC/LINE:MIC	2.0	4.0	6.0	
		EFFECT OUT		Input level:-60 dBu CH1-4 MIC/LINE:MIC	-8.0	-6.0	-4.0	
		REC OUT		Input level:-60 dBu CH1-4 MIC/LINE:MIC	-12.0	-10.0	-8.0	dBV
	CH 1-4 INPUT A	MAIN OUT		Input level:-50 dBu MIC/LINE:MIC	2.0	4.0	6.0	dBu
	CH 5/6-7/8 LINE (Phone)	MAIN OUT		Input level:-20 dBu	2.0	4.0	6.0	
	CH 9/10-11/12 LINE (Pin)	MAIN OUT		Input level:-20 dBu	2.0	4.0	6.0	
Total Harmonic Distortion It measures in each CH unit. (THD+N)	CH INPUT 1-11/12	MAIN OUT, MONITOR OUT, EFFECT OUT, REC OUT	10 kΩ	+14 dBu @ 20 Hz, 1 kHz, 20 kHz			0.5	%
Hum & Noise (20 Hz-20 kHz) It measures in each CH unit. EIN=Equivalent Input Noise	CH 1-4 INPUT B, CH 5/6-11/12 MIC	MAIN OUT	10 kΩ	EIN, Rs=150 Ω CH1-4 MIC/LINE:MIC			-115	dBu
	CH INPUT 1-11/12	MAIN OUT, MONITOR OUT, EFFECT OUT		Output Noise Rs=150 Ω CH1-4 MIC/LINE:MIC			-50	
Residual Output Noise (20 Hz-20 kHz)	—	MAIN OUT L, R	10 kΩ	Master control at minimum.			-90	dBu
		MONITOR OUT	10 kΩ				-90	
		SPEAKERS OUT	4 Ω				-65	

	Input	Output	Conditions	MIN	TYP	MAX	UNIT
Crosstalk @ 1 kHz It measures in each CH unit.	CH1-4	Adjacent CH inputs				-65	dB
		MAIN OUT	Input to Output (LEVEL controls: minimum)			-65	
	Output	—		MIN	TYP	MAX	UNIT
Phantom Voltage It measures in each CH unit.	CH 1-4 INPUT B, CH 5/6-11/12 MIC	—	No load	14	15	16	V

CH & ST CH Equalization	HIGH	Turn over /roll-off frequency of shelving :3dB below maximum variable level. ±15dB maximum	10 k (shelving)	Hz
	MID		2.5 k (peaking)	
	LOW		100 (shelving)	
Internal Digital Effect	16 programs Parameter control			
	FOOT SW		ON/OFF	
Level Meters	2 × 5-points LED level meter [MAIN(L,R)], 5-points LED level meter [MONITOR] +6, +3, 0, -5, -10 [dB]			
FCL Sensitivity	Input signal level ≥ -75dBu: LED on, CH1-4 MIC/LINE:MIC B Input, CH 5/6-11/12 MIC Input			
Protection	Power Amplifier	POWER switch on/off mute DC-fault :power supply shutdown /manual reset Thermal /heatsink temp ≥ 90°C:output mute /auto reset VI limiter /RL ≤ 2 Ω Clip limiter /THD ≥ 1 %, Indicator × 2		
	Power Supply	Thermal /heatsink temp ≥ 100°C :power supply shutdown /manual reset		

		MIN	TYP	MAX	UNIT
Power Consumption	EMX512SC	500			W
	EMX312SC	450			
	EMX212S	300			
AC Cord	Length	2450	2500	2550	mm
Dimensions	Height	284			mm
	Depth	264			
	Width	442.5			
Net Weight		8			kg

Included Accessories	Power cord, Rubber stabilizers × 2, Owner's Manual
Options	RACK MOUNT KIT (RK512), FOOT SW (FC5)

Note: All level control normally: Maximum level, Output impedance of signal generator :150 ohm

■ Input Characteristics

Input Terminals		MIC/LINE	Actual Load Impedance	For Use with Nominal	Input Level			Connector
					Sensitivity *2	Nominal (▼ position)	Max. before Clip	
CH INPUT 1-4	XLR	MIC	2 kΩ	50–600 Ω Mics	–60 dBu (0.775 mV)	–35 dBu (13.8 mV)	–15 dBu (138 mV)	XLR-3-31 type *3
		LINE			–30 dBu (24.5 mV)	–5 dBu (436 mV)	+15 dBu (4.36 V)	
	Phone	MIC	6 kΩ	600 Ω Lines	–50 dBu (2.45 mV)	–25 dBu (43.6 mV)	–5 dBu (436 mV)	Phone Jack *4
		LINE			–20 dBu (77.5 mV)	+5 dBu (1.38 V)	+25 dBu (13.8 V)	
CH INPUT 5/6, 7/8	XLR	—	2 kΩ	50–600 Ω Mics	–60 dBu (0.775 mV)	–35 dBu (13.8 mV)	–15 dBu (138 mV)	XLR-3-31 type *3
	Phone	—	10 kΩ	600 Ω Lines	–20 dBu (77.5 mV)	+5 dBu (1.38 V)	+25 dBu (13.8 V)	Phone Jack *5
CH INPUT 9/10, 11/12	XLR	—	2 kΩ	50–600 Ω Mics	–60 dBu (0.775 mV)	–35 dBu (13.8 mV)	–15 dBu (138 mV)	XLR-3-31 type *3
	Pin	—	10 kΩ	600 Ω Lines	–20 dBu (77.5 mV)	+5 dBu (1.38 V)	+25 dBu (13.8 V)	RCA Pin Jack

*1 0 dBu is referenced to 0.775 Vrms.

*2 Sensitivity is the lowest level that will produce an output of +4 dB (1.23 V), or the nominal output level when the unit is set to maximum level. (All level controls are at maximum position.)

*3 XLR-3-31 type connectors are balanced. (1=GND, 2=HOT, 3=COLD)

*4 Phone Jacks are balanced. (Tip=HOT, Ring=COLD, Sleeve=GND)

*5 Phone Jacks are unbalanced.

■ Output Characteristics

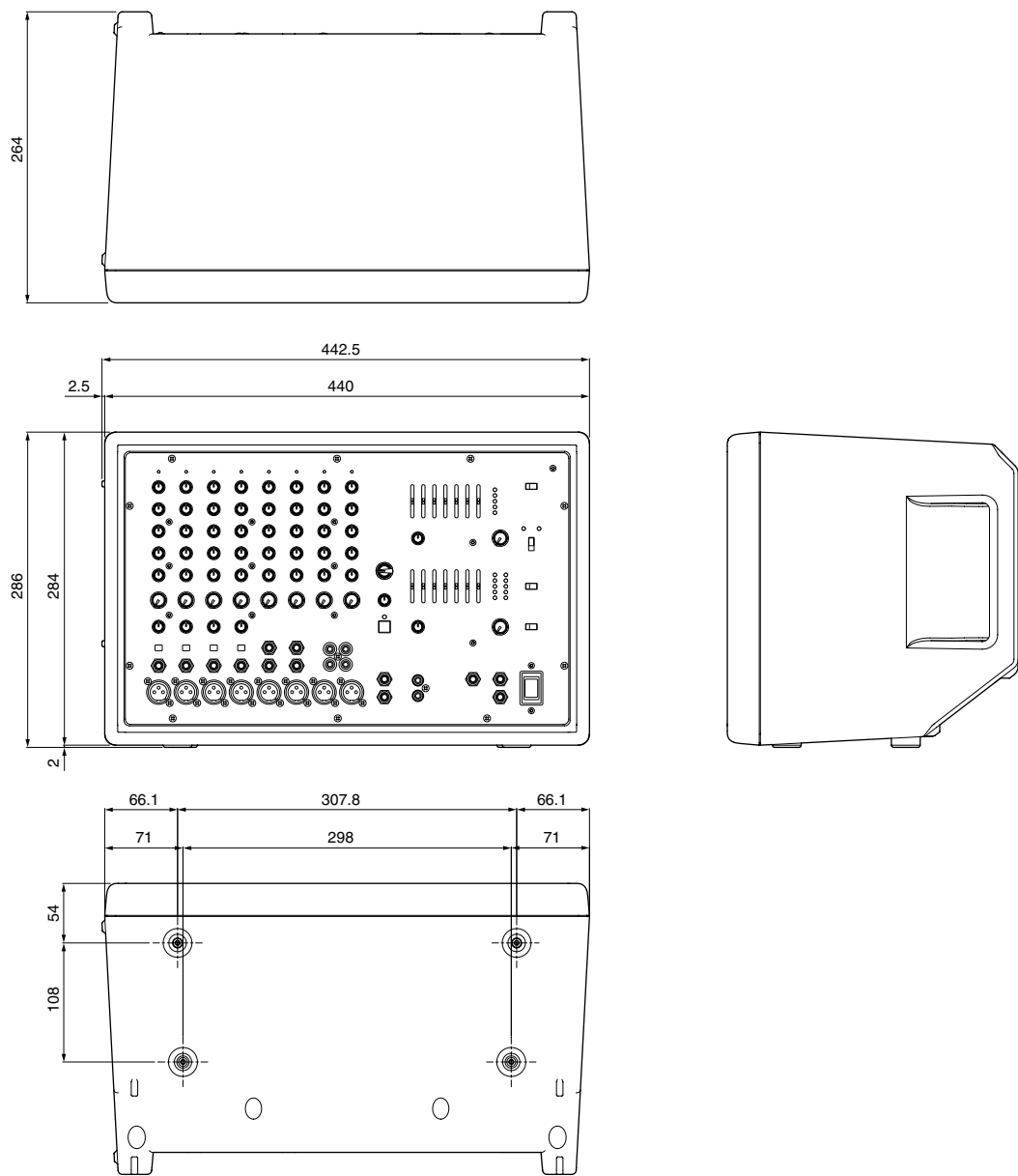
Output Terminals	Actual Source Impedance	For Use with Nominal		Output Level		Connector
				Nominal	Max. before Clip	
SPEAKERS [A1, A2, B1, B2]	0.1 Ω	4 Ω Speakers	EMX512SC	125 W	500 W	[A1, B1] SPEAKON [A2, B2] Phone Jack
			EMX312SC	75 W	300 W	
			EMX212S	50 W	220 W	
MAIN OUT [L, R]	600 Ω	10 kΩ Lines	—	+4 dBu (1.23 V)	+20 dBu (7.75 V)	Phone Jack *2
EFFECT OUT	600 Ω	10 kΩ Lines	—	+4 dBu (1.23 V)	+20 dBu (7.75 V)	Phone Jack *2
MONITOR OUT	600 Ω	10 kΩ Lines	—	+4 dBu (1.23 V)	+20 dBu (7.75 V)	Phone Jack *2
REC OUT [L, R]	600 Ω	10 kΩ Lines	—	–10 dBV (316 mV)	+10 dBV (3.16 V)	RCA Pin Jack

*1 0 dBu is referenced to 0.775 Vrms. 0 dBV is referenced to 1 Vrms.

*2 Phone Jacks are unbalanced.

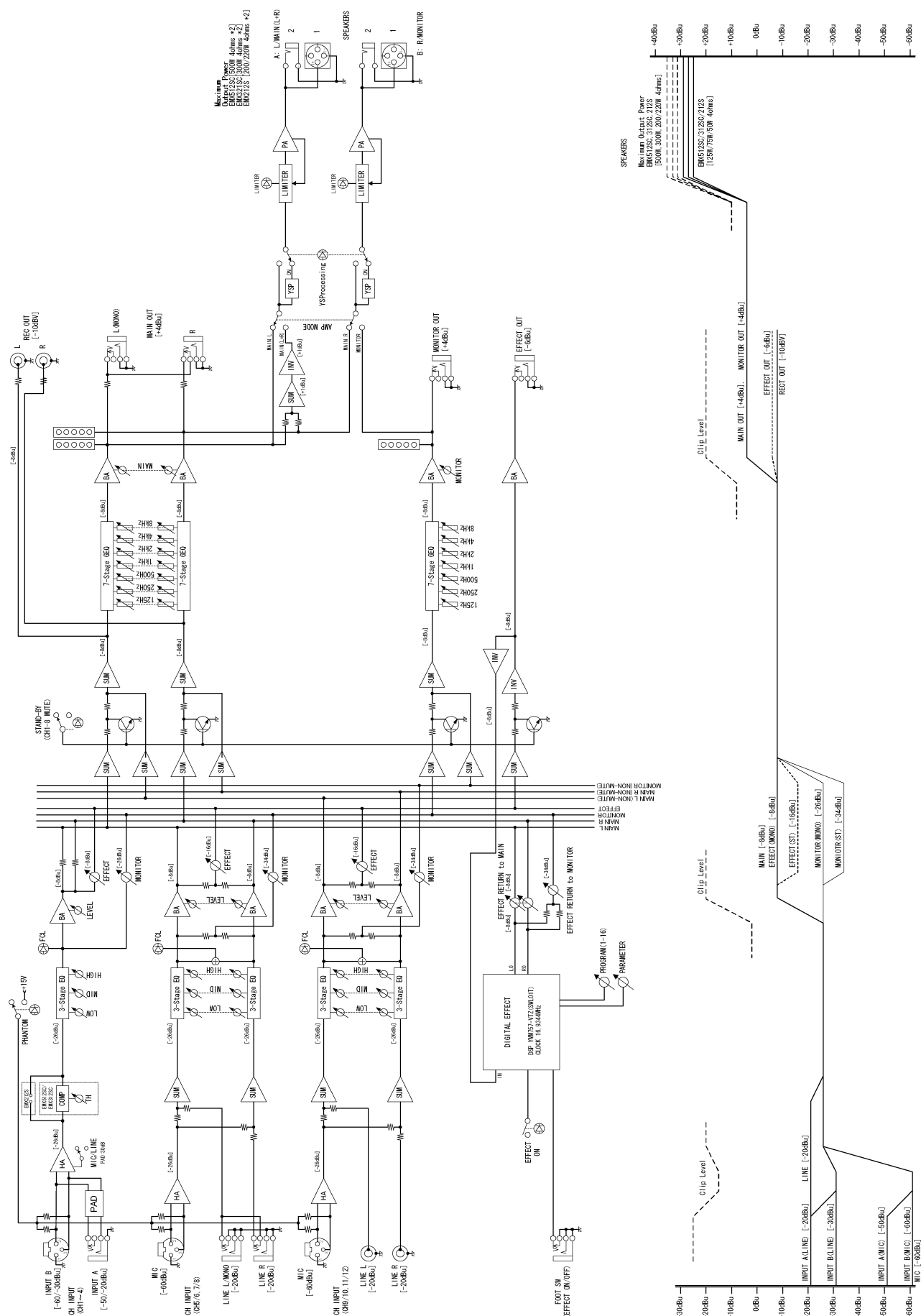
Specifications and descriptions in this owner's manual are for information purposes only. Yamaha Corp. reserves the right to change or modify products or specifications at any time without prior notice. Since specifications, equipment or options may not be the same in every locale, please check with your Yamaha dealer.

Dimensional Diagrams



Unit: mm

Block Diagram and Level Diagram



For details of products, please contact your nearest Yamaha representative or the authorized distributor listed below.

Pour plus de détails sur les produits, veuillez-vous adresser à Yamaha ou au distributeur le plus proche de vous figurant dans la liste suivante.

Die Einzelheiten zu Produkten sind bei Ihrer unten aufgeführten Niederlassung und bei Yamaha Vertragshändlern in den jeweiligen Bestimmungsländern erhältlich.

Para detalles sobre productos, contacte su tienda Yamaha más cercana o el distribuidor autorizado que se lista debajo.

NORTH AMERICA

CANADA

Yamaha Canada Music Ltd.
135 Milner Avenue, Scarborough, Ontario,
M1S 3R1, Canada
Tel: 416-298-1311

U.S.A.

Yamaha Corporation of America
6600 Orangethorpe Ave., Buena Park, Calif. 90620,
U.S.A.
Tel: 714-522-9011

CENTRAL & SOUTH AMERICA

MEXICO

Yamaha de México S.A. de C.V.
Calz. Javier Rojo Gómez #1149,
Col. Guadalupe del Moral
C.P. 09300, México, D.F., México
Tel: 55-5804-0600

BRAZIL

Yamaha Musical do Brasil Ltda.
Rua Joaquim Floriano, 913 - 4º andar, Itaim Bibi,
CEP 04534-013 São Paulo, SP, BRAZIL
Tel: 011-3704-1377

ARGENTINA

**Yamaha Music Latin America, S.A.
Sucursal de Argentina**
Olga Cossettini 1553, Piso 4 Norte
Madero Este-C1107CEK
Buenos Aires, Argentina
Tel: 011-4119-7000

PANAMA AND OTHER LATIN AMERICAN COUNTRIES/ CARIBBEAN COUNTRIES

Yamaha Music Latin America, S.A.
Torre Banco General, Piso 7, Urbanización Marbella,
Calle 47 y Aquilino de la Guardia,
Ciudad de Panamá, Panamá
Tel: +507-269-5311

EUROPE

THE UNITED KINGDOM

Yamaha Music U.K. Ltd.
Sherbourne Drive, Tilbrook, Milton Keynes,
MK7 8BL, England
Tel: 01908-366700

GERMANY

Yamaha Music Europe GmbH
Siemensstraße 22-34, 25462 Rellingen, Germany
Tel: 04101-3030

SWITZERLAND/LIECHTENSTEIN

**Yamaha Music Europe GmbH
Branch Switzerland in Zürich**
Seefeldstrasse 94, 8008 Zürich, Switzerland
Tel: 01-383 3990

AUSTRIA

Yamaha Music Europe GmbH Branch Austria
Schleiergasse 20, A-1100 Wien, Austria
Tel: 01-60203900

CZECH REPUBLIC/SLOVAKIA/ HUNGARY/SLOVENIA

Yamaha Music Europe GmbH Branch Austria
Schleiergasse 20, A-1100 Wien, Austria
Tel: 01-602039025

POLAND

**Yamaha Music Europe GmbH
Branch Sp.z o.o. Oddział w Polsce**
ul. 17 Stycznia 56, PL-02-146 Warszawa, Poland
Tel: 022-868-07-57

THE NETHERLANDS/ BELGIUM/LUXEMBOURG

Yamaha Music Europe Branch Benelux
Clarissenhof 5-b, 4133 AB Vianen, The Netherlands
Tel: 0347-358 040

FRANCE

Yamaha Musique France
BP 70-77312 Marne-la-Vallée Cedex 2, France
Tel: 01-64-61-4000

ITALY

**Yamaha Musica Italia S.P.A.
Combo Division**
Viale Italia 88, 20020 Lainate (Milano), Italy
Tel: 02-935-771

SPAIN/PORTUGAL

Yamaha Música Ibérica, S.A.
Ctra. de la Coruna km. 17, 200, 28230
Las Rozas (Madrid), Spain
Tel: 91-639-8888

SWEDEN

Yamaha Scandinavia AB
J. A. Wettergrens Gata 1, Box 30053
S-400 43 Göteborg, Sweden
Tel: 031 89 34 00

DENMARK

YS Copenhagen Liaison Office
Generatorvej 6A, DK-2730 Herlev, Denmark
Tel: 44 92 49 00

NORWAY

Norsk filial av Yamaha Scandinavia AB
Grini Næringspark 1, N-1345 Østerås, Norway
Tel: 67 16 77 70

RUSSIA

Yamaha Music (Russia)
Office 4015, entrance 2, 21/5 Kuznetskii
Most street, Moscow, 107996, Russia
Tel: 495 626 0660

OTHER EUROPEAN COUNTRIES

Yamaha Music Europe GmbH
Siemensstraße 22-34, 25462 Rellingen, Germany
Tel: +49-4101-3030

AFRICA

**Yamaha Corporation,
Asia-Pacific Music Marketing Group**
Nakazawa-cho 10-1, Naka-ku, Hamamatsu,
Japan 430-8650
Tel: +81-53-460-2313

MIDDLE EAST

TURKEY/CYPRUS

Yamaha Music Europe GmbH
Siemensstraße 22-34, 25462 Rellingen, Germany
Tel: 04101-3030

OTHER COUNTRIES

Yamaha Music Gulf FZE
LOB 16-513, P.O.Box 17328, Jubel Ali,
Dubai, United Arab Emirates
Tel: +971-4-881-5868

ASIA

THE PEOPLE'S REPUBLIC OF CHINA

Yamaha Music & Electronics (China) Co., Ltd.
2F, Yunhedasha, 1818 Xinzha-lu, Jingan-qu,
Shanghai, China
Tel: 021-6247-2211

INDIA

Yamaha Music India Pvt. Ltd.
5F Ambience Corporate Tower Ambience Mall Complex
Ambience Island, NH-8, Gurgaon-122001, Haryana, India
Tel: 0124-466-5551

INDONESIA

**PT. Yamaha Music Indonesia (Distributor)
PT. Nusantara**
Gedung Yamaha Music Center, Jalan Jend. Gatot
Subroto Kav. 4, Jakarta 12930, Indonesia
Tel: 21-520-2577

KOREA

Yamaha Music Korea Ltd.
8F, 9F, Dongsung Bldg. 158-9 Samsung-Dong,
Kangnam-Gu, Seoul, Korea
Tel: 080-004-0022

MALAYSIA

Yamaha Music Malaysia, Sdn., Bhd.
Lot 8, Jalan Perbandaran, 47301 Kelana Jaya,
Petaling Jaya, Selangor, Malaysia
Tel: 3-78030900

SINGAPORE

Yamaha Music Asia Pte., Ltd.
#03-11 A-Z Building
140 Paya Lebar Road, Singapore 409015
Tel: 747-4374

TAIWAN

Yamaha KHS Music Co., Ltd.
3F, #6, Sec.2, Nan Jing E. Rd. Taipei.
Taiwan 104, R.O.C.
Tel: 02-2511-8688

THAILAND

Siam Music Yamaha Co., Ltd.
4, 6, 15 and 16th floor, Siam Motors Building,
891/1 Rama 1 Road, Wangmai,
Pathumwan, Bangkok 10330, Thailand
Tel: 02-215-2626

OTHER ASIAN COUNTRIES

**Yamaha Corporation,
Asia-Pacific Music Marketing Group**
Nakazawa-cho 10-1, Naka-ku, Hamamatsu,
Japan 430-8650
Tel: +81-53-460-2317

OCEANIA

AUSTRALIA

Yamaha Music Australia Pty. Ltd.
Level 1, 99 Queensbridge Street, Southbank,
Victoria 3006, Australia
Tel: 3-9693-5111

COUNTRIES AND TRUST TERRITORIES IN PACIFIC OCEAN

**Yamaha Corporation,
Asia-Pacific Music Marketing Group**
Nakazawa-cho 10-1, Naka-ku, Hamamatsu,
Japan 430-8650
Tel: +81-53-460-2313

HEAD OFFICE Yamaha Corporation, Pro Audio & Digital Musical Instrument Division
Nakazawa-cho 10-1, Naka-ku, Hamamatsu, Japan 430-8650
Tel: +81-53-460-2441

PA24

Yamaha Pro Audio global web site
<http://www.yamahaproaudio.com/>
Yamaha Manual Library
<http://www.yamaha.co.jp/manual/>

U.R.G., Pro Audio & Digital Musical Instrument Division, Yamaha Corporation
© 2005 Yamaha Corporation
WE29640 904CRAP2.3-12D0
Printed in China